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A National Environmental/Energy Workforce Assessment. Florida

National Field Research Center, Inc, Iowa City, Iowa

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A National Environmental/Energy Workforce Assessment

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16. ABSTRACT

This study is one of 70 volumes assessing the workforce needs (manpower needs) for pollution control and abatement in the United States for the five-year period of 1976 through 1981. Seven fields for pollution control — air, noise, pesticides, potable water, radiation, solid waste, and wastewater — are analyzed, together with energy-related programs currently accentuated by the national effort to solve energy supply problems.

Designed as Phase I of a three-phase program, the complete assessment includes the following volumes: one each for the 50 states, the District of Columbia, Puerto Rico, and the Virgin Islands; one for each of the ten EPA regions; a one-volume National Abstract; a volume on National Legislation; a volume on Business and Industry; and a four-volume National Summary. The information was gathered through extensive personal interviews with responsible federal, state, and local officials in every state; with officials of representative private industrial and commercial firms; and with representatives of national industrial and trade organizations.

Phase II will develop a broad national inventory of the entire range of post-secondary and higher education training offered in the pollution control and energy areas cited above, and Phase III will offer demonstrations for curriculum changes or modifications which appear necessary to assure an adequate and properly trained national environmental/energy workforce.

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UNITED STATES

ENVIRONMENTAL PROTECTION AGENCY

Grant #T900591010
1977

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PREFACE

This report presents existing workforce levels, training programs, and career potentials and develops staffing level projections (1976-1981) based upon available information for the State of Florida in the environmental pollution control areas of air, noise, potable water, pesticides, radiation, solid waste, waste water, and energy. This study was carried out for the United States Environmental Protection Agency by National Field Research Center of Iowa City, Iowa.

The information and data presented in this report were compiled in large part from extensive interviews with professionals working in the respective areas and were supplemented by telephone surveys and research.

FOREWORD

The material included herein contains the information and data collected for eight individual pollution control inventories conducted for Florida. The format includes workforce profiles, projections, growth and career potential for each of the areas investigated. Growth projections are necessarily best professional estimates developed from available information and represent what are felt to be realistic figures by experts in the respective areas. The pollution areas considered by this study are as follows:

Air
Noise
Pesticides
Potable Water
Radiation
Solid Waste
Waste Water
Energy

National Environmental Energy Workforce Assessment

Phase I

FLORIDA

State Summary

I. AIR

The Florida Department of Environmental Regulation (DER) is responsible for the state's air pollution control program. Sources indicate that at least one-half of Florida's air pollution problems are caused by transportation. At the present time, approximately 66 person-years in the Department are expended toward the air program, chiefly engineers, scientists and technicians. DER sources estimate that by 1982, the number of persons in the air porgram will be approximately 150% of its current level, for a total of 99 positions.

There are currently 14 local air programs in the state, six of which are partially supported by federal funds. Approximately 111 person-years are currently involved in these programs. An approximate 10% annual workforce growth rate is expected by officials in the field.

It appears that there are 1,000 to 1,300 persons working in air pollution control in Florida, most (est. 85%) in the private sector, servicing the field on a part-time basis. Private sector growth is expected to be minimal, although greater use may be made of technicians as they are available.

State and local officials have of necessity reduced the formal technical training to air pollution personnel, chiefly because of budget restraints. Officials indicate that this situation could severely handicap the programs. Participation in the Southeastern Air Pollution Training Committee that was formed by the Region IV Environmental Protection should assist the public agencies in meeting training needs.

II. NOISE

The Department of Environmental Regulation is the state agency responsible for environmental noise control in Florida. State laws currently allow for regulation of environmental noise stemming from motor vehicles, the state's largest single cause of noise pollution. In addition to implementing the motor vehicle program, DER has cooperated with five universities in providing technical assistance to cities and counties. The program is currently staffed with two persons, and about 20 persons from the universities are involved with the program. Five-year projections provide for a total of four to five full-time persons for noise in DER, and one or two persons in each DER district office to assist part-time with the program. Sources indicate that the number involved in universities with the program will double within five years.

Seven local agencies are involved in noise control, for a total of approximately 100 person-years, representing as many as 25 people. This number is expected to double by 1982. In addition, 260 law enforcement officers have been trained in the field and carry out enforcement duties. This number may increase by 30 within five years.

Sources are aware of three university professors that offer consulting services in the field, as well as one other private firm. Few industries currently address environmental noise. The industrial workforce for environmental noise will grow to some degree, and the number of consultants will increase within five years.

III. PESTICIDES

The enforcement of the Florida Pesticide Law is charged to the Florida Department of Agriculture and Consumer Services. To carry out the required pesticide program, the Department entered into agreement with the following state agencies: The Department of Health and Rehabilitative Services, the Department of Natural Resources, the Department of Environmental Regulation and the Institute of Food and Agricultural Sciences (IFAS). Each agency has specified functions for carrying out the State Certification Plan. Within these agencies are approximately 254 persons that service the pesticides field on a full-or part-time basis, and most are degreed, with agricultural backgrounds. This number includes 125 county extension leaders that train private applicators. Only the lead agency expects to increase its staffing level in the next five years.

State sources estimate that 16,500 private applicators will require certification by October 21, 1977, as will approximately 5,000 commercial applicators. State officials found it difficult to speculate concerning career potentials in the area of application. However, it appears that the greatest employment opportunities will exist in the area of aquatic weed control, particularly because of problems with the hydrilla plant. Such a demand for trained personnel is expected that officials forecast a need for related institutional training programs.

Most of the training for applicator certification is carried out by IFAS and county extension leaders.

IV. POTABLE WATER

The Department of Environmental Regulation is responsible for Florida's potable water program. The state plans to assume primacy for the Federal Safe Drinking Water Act during 1977, although new legislation will be required to have full legal authority.

The Department currently utilizes approximately 25 person-years of effort for its potable water program. Nine county health departments also provide the services of sanitary engineers, and seventeen chemists provide laboratory analyses of drinking water samples. The number of DER personnel for this program will increase during 1977 to approximately 23. Further increases will be contingent on future engineering and staffing commitments by the Department of Health and Rehabilitative Services through its county health departments and laboratories. Officials project that major staffing needs will be met within one to two years.

All operators of water treatment plants must be certified. There are 1,934 certificates issued to operators. A growth in the number of operators is projected at approximately 8% per year. The DER administers the certification program, and approves courses and programs for operators. Sources predict that available opportunities will be adequate for meeting needs within several years.

At the state level, demands should increase for engineers, chemists, biologists and laboratory technicians. The chief demand for operators should be for those at the entry level.

V. RADIATION

Radiation control functions in Florida are the responsibility of the Department of Health and Rehabilitative Services, carried out through its Radiological Health Program and Office of Laboratory Services. A chief radiological problem in the state stems from phosphate mining in central Florida. In addition three nuclear power units are operable in the state, and several more are under construction.

The principal problems of the overall program are that it is both understaffed and underfunded to carry out all needed functions. There are currently 29 persons working at the state level: 19 health physicists, 3 chemists, one laboratory technican and 6 clerical employees. If all of the required positions, as is projected, are received by 1981, the overall program will have a total staff of 55, the majority being health physicists.

There are an estimated 35 health physicists employed by Florida's nuclear power plants, hospitals and industry. Approximately 50 nuclear and medical X-ray technicians devote a portion of their time to environmental radiation surveillance activities. These numbers are expected to grow because of the expanding nuclear industry and increased usage of radioisotopes and X-ray machines.

In sum, it appears that career opportunities for radiation control personnel, such as health physicists, radiation physicists and radiation control technicians will increase during the next five years. State sources also foresee a need developing for research scientists in the radiation field.

VI. SOLID WASTE

Solid waste control functions are principally carried out in the state by the Florida Department of Environmental Regulation (DER). The Resource Recovery Council promotes resource recovery in the state and recommends legislation. The DER will implement a solid waste program under the mandates of the Federal Resource Conservation and Recovery Act of 1976. Approximately 25 person-years in DER are expended toward solid waste, consisting chiefly of engineers and scientists. Additional positions have been requested, but may not be allocated because of budget limitations. Specific projections are not readily available for reasons that include the recency of the federal Act's passage.

Thirteen local agencies carry out planning and implementation of solid waste control activities. Approximately 16 person-years of effort are expended in this area. This effort may double within several years, but subsequent growth rates cannot be accurately predicted at this time.

State sources have estimated that there are currently 800 to 1,000 landfill operators in the state. This number is expected to increase, possibly to 1,500. If resource recovery programs become implemented, this growth rate may be higher, causing a need for operators with higher skills, for trained technicians and for highly skilled engineers. For hazardous waste programs, requirements are expected to occur for technicians, scientists and engineers. Specific growth rates will become increasingly apparent in the future.

VII. WASTEWATER

Implementation of Florida's wastewater program is assigned to the Department of Environmental Regulation (DER). In the Department, approximately 233 person-years are devoted to the water quality program. Because of state budget limitations, officials predict that this number will remain relatively stable over the next five years. Florida has accepted NPDES permitting authority.

Fifteen local agencies have wastewater programs. There are currently approximately 224 person-years in these agencies expended toward these programs, and sources in the field suggest that this number may grow by approximately 10% annually.

Florida laws require that operators of wastewater treatment plants be certified, and there are currently 2,706 certificates issued to operators, not including Grade D, the lowest grade, for which figures are unavailable. An average annual growth rate for the next five years is projected at approximately 8%.

The DER certifies plant operators and will attempt to gain authority to require certification of operators of wastewater collection systems. The DER also sets guidelines and approves curricula in the state for training operators. Officials project that within several years available training opportunities will be adequate for meeting needs.

Increased opportunities should occur for engineers, scientists and technicians in local pollution control programs. Opportunities should also increase for entry level wastewater treatment plant operators.

VIII. ENERGY

The State of Florida has two main energy agencies, with the State Energy Office assuming the primary role. This Office is responsible for the planning, development, coordination and implementation of the state energy program which includes energy conservation, contingency planning, allocation, data collection, analysis, public information and education. The Governor's Petroleum Allocation and Energy Conservation Council has the responsibility of assisting in the implementation of the mandatory allocation program and minimizing the adverse effects of fuel shortages. Several other state agencies are involved in the field of energy in some manner.

The State Energy Office is currently staffed with 18 persons. The Office has received planning grants from the Federal Energy Policy and Conservation Act to carry out an energy conservation program. An increased workforce will occur and sources project that the Office will be staffed with 40 persons by 1982, chiefly with energy analysts, energy specialists and planners.

Energy officials are confident that the career potential in the field of energy will markedly improve over the next five years. A growth potential in the field of solar energy is forecast.

STATE OF FLORIDA - SUMMARY

National Environmental/Energy Workforce Assessment
Pollution Control & Abatement Personnel
Projected Workforce Requirements (1976-1981)

Environmental Area	1976	1977	1978	1979	1980	1981	%/annum growth (average)
AIR[1]	177	194	223	244	267	290	10%
NOISE[2]	307	340	353	365	378	391	5%
PESTICIDES[3]	254	256	262	262	262	262	1%
POTABLE WATER[4]	1,968	2,146	2,317	2,501	2,702	2,920	8%
RADIATION[5]	29	32	38	44	50	55	14%
SOLID WASTE[6]	941	1,064	1,187	1,311	1,434	1,557	11%
WASTEWATER[7]	3,163	3,140	3,378	3,636	3,916	4,220	6%
ENERGY[8]	18	22	30	32	35	40	18%
TOTALS	6,857	7,194	7,778	8,395	9,044	9,735	7%

[1] Includes the state and local agencies. An estimated 800 to 1,100 currently service the field in the private sector, and little workforce growth is expected.

[2] Includes the state agency, local programs, state universities and law enforcement officials.

[3] Includes public agencies. Not included are an estimated 5,000 commercial and 16,500 private applicators.

[4] Includes the lead agency, county sanitary engineers and certified water treatment plant operators. Not included is laboratory capability of the Department of Health and Rehabilitative Services (HRS).

[5] Includes the state agency. An estimated 85 persons in the private sector are engaged in radiation control on a full- or part-time basis.

[6] The 1976 figure includes the state agency, local programs and the estimated number of landfill operators. Projections do not include the state agency.

[7] The above includes the state agency, local agencies and certified wastewater treatment plant operators.

[8] Includes only the state agency personnel.

EDUCATION

There are many educational institutions in Florida that include environmental programs in their curricula. The University of Florida offers B.S., M.S., and Ph.D. degrees in Environmental Engineering Sciences, Civil Engineering, and Nuclear Engineering, as well as housing a Center for Training, Research and Education for Environmental Occupations. Florida A&M University offers A.S. and B.S. degrees in Entomology and Structural Pest Control. Florida Technological University awards bachelor degrees in Civil Engineering and Environmental Sciences. Florida International and Heed Universities both provide environmental curricula with a variety of concentrations.

Rollins College utilizes a multidisciplinary approach to its Environmental Studies. Miami-Dade Community College provides both Environmental Control Technology and Civil Engineering programs on an associate degree level. There are several remaining colleges that offer environmental curricula in such areas as Pest Control Technology, Environmental Control Engineering, Water and Wastewater Technology, Environmental Studies and Science. They are: Broward, Brevard, and Sante Fe Community Colleges and Manatee and St. John's River Junior Colleges.

A number of two year schools offer courses/degrees in water/wastewater technology. State sources predict that 20-25 such programs will be operational and certified by the state agency within several years.

LEGISLATION

The environmental/energy legislation for Florida was obtained by request from various agency personnel and through various library references. Summaries of the legislation deemed most relevant to the eight subject areas of the workforce assessment were prepared, and are included in the respective state reports. The following list of laws represents virtually all environmental legislation for the state. Only certain of the following laws were summarized; the list is presented to show, by title, the kinds of laws which have been enacted.

Environmental Protection Act

Air and Water Pollution Control Act

Motor Vehicle Noise Prevention and Control Act

Pesticide Application Act of 1974

Pesticide Law

Water Resources Act of 1972

Florida Litter Law

Resource Recovery and Management Act

Sewage Disposal Facilities Law

Environmental Land and Water Management Act of 1972

Pollutant Spill Prevention and Control Act

Beach and Shore Preservation Act

Reclamation of Lands Disturbed by the Severance of Solid Minerals Act

National Environmental Energy Workforce Assessment

Phase I

FLORIDA

State Report

13

STATE PROFILE

Florida is located in the Southeast United States, forming a peninsula that reaches 500 miles to the south. With 580 miles of Atlantic coastline and 770 miles of coastline along the Gulf of Mexico, and a warm climate, Florida attracts millions of tourists each year. The state's population has grown rapidly in recent years, reaching approximately 8 million in 1974. Eighty-four percent of the population lives in metropolitan areas.

Florida contains eight metropolitan areas with populations of over 250,000. These areas are: Jacksonville, Fort Lauderdale-Hollywood, Lakeland-Winterhaven, Miami, Orlando, Pensacola, Tampa-St. Petersburg, and West Palm Beach-Boca Raton.

Industrial gains have been made in recent years, and the state's economy currently rests on a solid tripod of tourism, agriculture and industry. Industrial outputs in the state include processed food, chemicals, electrical equipment, transportation equipment, and metal and paper products. Florida is the nation's leading producer of phosphate rock and is second in the production of titanium. The commercial catch of fish and shellfish is a significant contributor to the economy.

Florida produces 80% of the nation's citrus fruits and ranks second in the production of vegetables. Leading crops include oranges, grapefruit, avocados, watermelons, limes, tangerines, sugarcane, peanuts, cotton, tomatoes, beans, celery and potatoes. Other important agricultural commodities include chickens and cattle.

The state's economy has patterned that of the nation's in recent years, demonstrating a strong recession. Florida's recovery has been slower than the nation's, however. A state economist has attributed this to Florida's continued slowdown in population growth. Persons under 35 years of age are no longer moving to Florida because of the poor economic conditions. This same economist predicted that Floridians will have more jobs, earn more money, buy more cars and build more homes in 1977 than in 1976, but these gains will translate into only a modest overall improvement in the state's economy. Tourism, construction and population growth will show continued growth, but construction will remain far below its 1973 peak.

FLORIDA POLLUTION CONTROL AND ABATEMENT AGENCIES

The Florida Department of Environmental Regulation (DER) is the principal state environmental agency. This Department has primary responsibility for the air, noise, potable water, solid waste and wastewater programs. Additional state agencies or organizations concerned with environmental protection include the Department of Agriculture and Consumer Services, the Department of Health and Rehabilitative Services, the Department of Natural Resources, and the Institute of Food and Agricultural Sciences of the University of Florida. The state has two energy agencies, the State Energy Office and the Governor's Petroleum Allocation and Energy Conservation Council.

The Department of Environmental Regulation has three divisions: the Division of Environmental Programs, the Division of Environmental Permitting, and the Division of Administrative Services. Among the duties of the Division of Environmental Programs are assessing the air and water quality of the state and preparing plans and and programs to protect and enhance their quality, assuring adequate water quantities and safe drinking water supplies, administering the federal wastewater and drinking water construction grant program, and administering and coordinating noise control and solid waste programs. Duties of the Division of Environmental Permitting include processing permits, including power plant site applications, training and certification of drinking water and wastewater treatment plant operators and well drillers, reviewing environmental impact statements, writing and reviewing National Pollutant Discharge Elimination System (NPDES) permits, and providing technical expertise and supervision of operations taking place in the DER district offices. The Division of Administrative Services provides centralized administrative services such as personnel, purchasing, general services, budgeting and accounting, carries out DER's legislative program, and disseminates information to the public.

The Florida Department of Agriculture and Consumer Services is the lead agency for the certification of pesticide applicators and the registration of pesticides. Activities are chiefly carried out in the Department's Division of Inspection, Bureau of Feed, Seed, Fertilizer and Pesticide. The Office of Entomology, Department of Health and Rehabilitative Services examines and certifies individuals in the following categories: Ornamental and Turf, Structural and Health Related Pest Control, and Public Health Pest Control. Aquatic pest control applicators are trained and examined by the Department of Natural Resources. Training of most categories of applicators is carried out by the Institute of Food and Agricultural Sciences. The State Chemical Laboratory of the Department of Agriculture and Consumer Services has two pesticide laboratories: a pesticide residue lab and a pesticide formulation lab.

Radiation control functions take place in both the Radiological Health Program and the Office of Laboratory Services of the Florida Department of Health and Rehabilitative Services. The Radiological Health Program is responsible for registering X-ray machines, licensing radioactive materials and users, planning for environmental radiation surveillance, and providing technical expertise to the Department's field offices. The Office of Laboratory Services carries out environmental surveillance and inspection/compliance functions. These two units may be merged within the near future.

The State Energy office is responsible for the planning, development, coordination and implementation of the state energy program. The Office has prime responsibility for energy conservation, contingency planning, allocation, data collection, analysis, public information and education, and monitors energy research and development that is ongoing and of interest to the state. The Governor's Petroleum Allocation and Energy Conservation Council was created to advise and assist the State Allocation official in implementing the mandatory energy allocation program, and to minimize the adverse effects of fuel shortages.

There are currently 16 local pollution control programs, eight of which are partially supported by federal funds. The following depicts the counties/municipalities with pollution control programs, and the types of programs carried out:

County/Municipality	Air	Noise	Solid Waste	Water
Alachua County	X	-	X	X
Brevard County	X	-	X	X
Broward County	X	X	X	X
Dade County	X	-	-	X
Duval County	X	X	X	X
Hillsborough County	X	X	X	X
Lake County	-	-	-	X
Manatee County	X	-	X	X
Orange County	-	-	X	X
Palm Beach County	X	X	X	X
Pinellas County	X	X	-	-
Reedy Creek	X	-	X	X
St. Petersburg	X	X	X	X
Sarasota County	X	X	X	X
Seminole County	X	X	X	X
Volusia County	X	-	X	X

Key: X - Program Carried Out
- No Program

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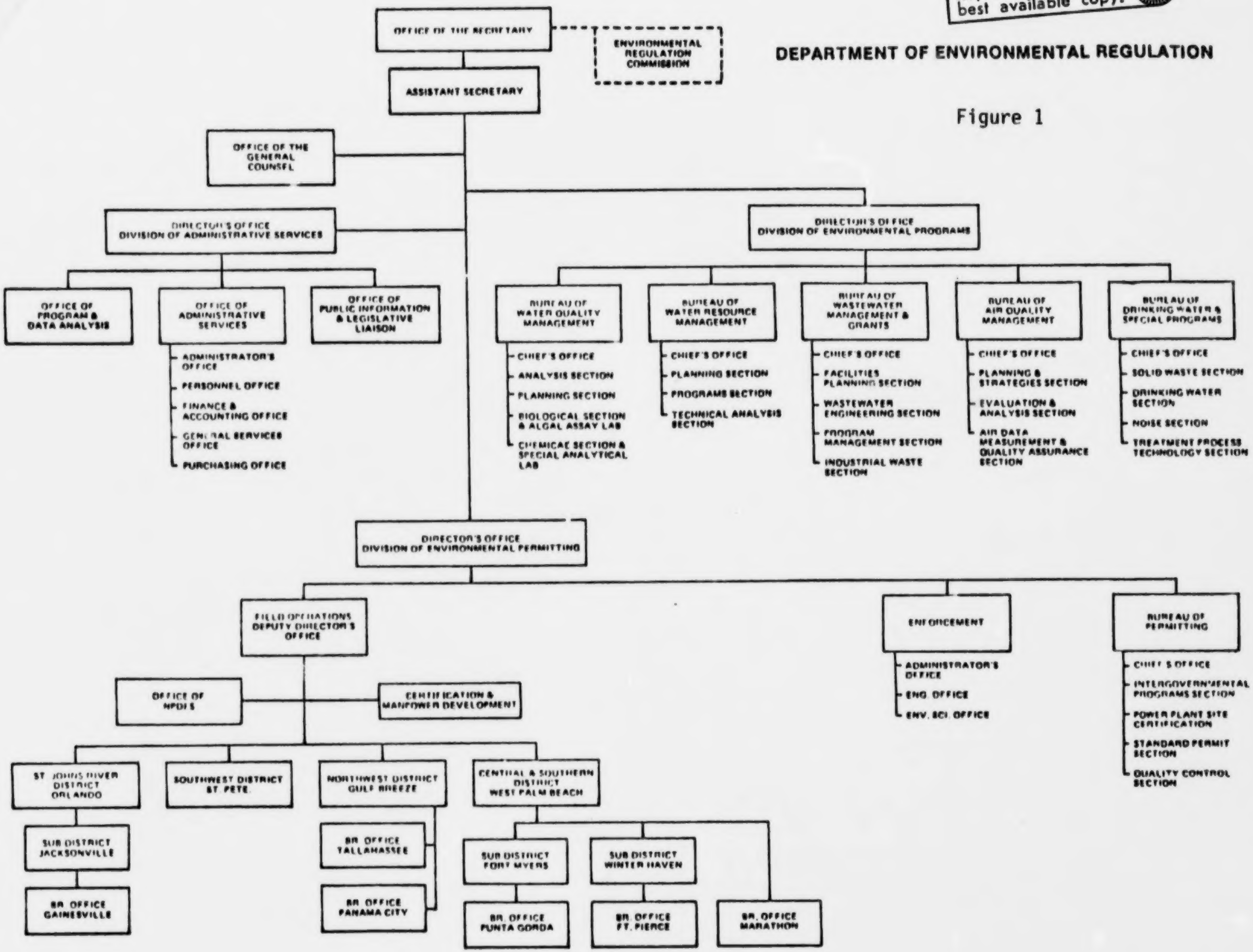
DEPARTMENT OF ENVIRONMENTAL REGULATION

Figure 1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PROGRAMS SECTION
TECHNICAL ANALYSIS SECTION
BUREAU OF WASTEWATER MANAGEMENT & GRANTS
CHIEF'S OFFICE
FACILITIES PLANNING SECTION
WASTEWATER ENGINEERING SECTION
PROGRAM MANAGEMENT SECTION
INDUSTRIAL WASTE SECTION
BUREAU OF AIR QUALITY MANAGEMENT
CHIEF'S OFFICE
PLANNING & STRATEGIES SECTION
EVALUATION & ANALYSIS SECTION
AIR DATA MEASUREMENT & QUALITY ASSURANCE SECTION
BUREAU OF DRINKING WATER & SPECIAL PROGRAMS
CHIEF'S OFFICE
SOLID WASTE SECTION
DRINKING WATER SECTION
NOISE SECTION
TREATMENT PROCESS TECHNOLOGY SECTION
DIRECTOR'S OFFICE DIVISION OF ENVIRONMENTAL PERMITTING
FIELD OPERATIONS DEPUTY DIRECTOR'S OFFICE
OFFICE OF NPDES
CERTIFICATION & MANPOWER DEVELOPMENT
ST. JOHNS RIVER DISTRICT ORLANDO
SUB DISTRICT JACKSONVILLE
BR. OFFICE GAINESVILLE
SOUTHWEST DISTRICT ST. PETE.
NORTHWEST DISTRICT GULF BREEZE
BR. OFFICE TALLAHASSEE
BR. OFFICE PANAMA CITY
CENTRAL & SOUTHERN DISTRICT WEST PALM BEACH
SUB DISTRICT FORT MYERS
BR. OFFICE PUNTA GORDA
SUB DISTRICT WINTER HAVEN
BR. OFFICE FT. PIERCE
BR. OFFICE MARATHON
ENFORCEMENT
ADMINISTRATOR'S OFFICE
ENG. OFFICE
ENV. SCI. OFFICE
BUREAU OF PERMITTING
CHIEF'S OFFICE
INTERGOVERNMENTAL PROGRAMS SECTION
POWER PLANT SITE CERTIFICATION
STANDARD PERMIT SECTION
QUALITY CONTROL SECTION

Pollution Control and Abatement Programs

I. AIR

A. Introduction

Authority for Florida's air pollution control and abatement program is granted through Florida Statutes Chapter 403, the Florida Air and Water Pollution Control Act. Implementation of the Act is assigned to the Department of Environmental Regulation, (DER) which is overseen by the Environmental Regulation Commission. The Commission, which is composed of seven citizens, exercises standard-setting authority of the Department, and acts as an adjudicatory body for final actions taken by the Department. The Commission also has final approving authority on applications for and disbursement of federal grants.

Among the authorities charged to the DER are the following: to approve and promulgate current and long-range plans developed to provide for air quality control, to adopt, modify and repeal rules and regulations to carry out the intent and purposes of the Act, to hold public hearings, to accept loans and grants, to issue orders and to establish ambient air quality standards. The Department is also given authority by the Act to require persons engaged in operations which may result in pollution to file reports, and to establish a permit system for the operation, construction, or expansion of any installation that may be a source of air pollution.

Chapter 403.182 authorizes counties and municipalities in the State to establish and administer local pollution control programs that comply with the Act. The DER maintains authority for the approval of local programs and to limit and/or assign specific responsibilities. There are currently 14 local air pollution control programs in the State, six of which are partially supported by federal funds.

Sources indicate that approximately one-half of Florida's air pollution problems are caused by transportation. Sulfur dioxide and particulates from industrial concerns also cause major problems. A sulfur dioxide study has been funded by the power industry which will be completed in June of 1978.

State and local officials indicate that air pollution control programs in the State are nearing their peak in terms of staffing and new program initiation. Workforce increases should continue through the next five years, after which time a stabilization should occur.

B. Workforce Profile

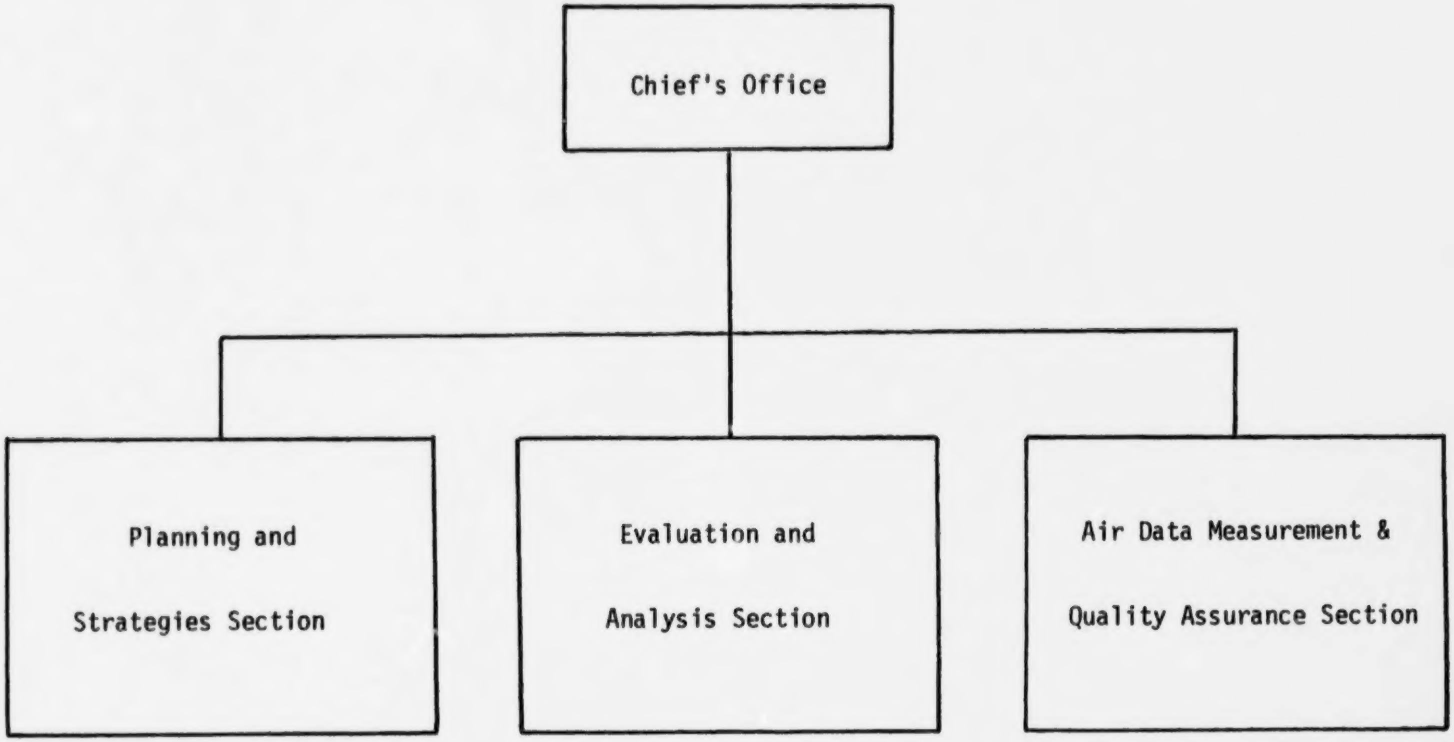
Chief responsibilities for implementation of the air quality control program in the DER are carried out by the Air Quality Management Bureau of the Division of Environmental Programs. Among the functions and activities of the Bureau are the following:

1) Developing air quality control strategies and reviewing effectiveness of existing strategies;
2) Coordinating operation, maintenance, calibration and quality assurance of statewide air monitoring equipment;
3) Coordinating laboratory activities concerning analysis and quality assurance of air samples;
4) Developing air quality maintenance plans including computer modeling activities;
5) Reviewing ambient air quality data and source emission data, and evaluating trends in air quality;
6) Performing emission tests on air pollution sources;
7) Preparing applications for air pollution grants from EPA, and coordinating the generation and submission of data for EPA reports.

The district and subdistrict offices of DER's Division of Environmental Permitting carry out the majority of permitting activities, issuing permits to direct sources, such as power plants, incinerators and paper mills, and to indirect sources such as highways and parking lots. Ambient air monitoring is

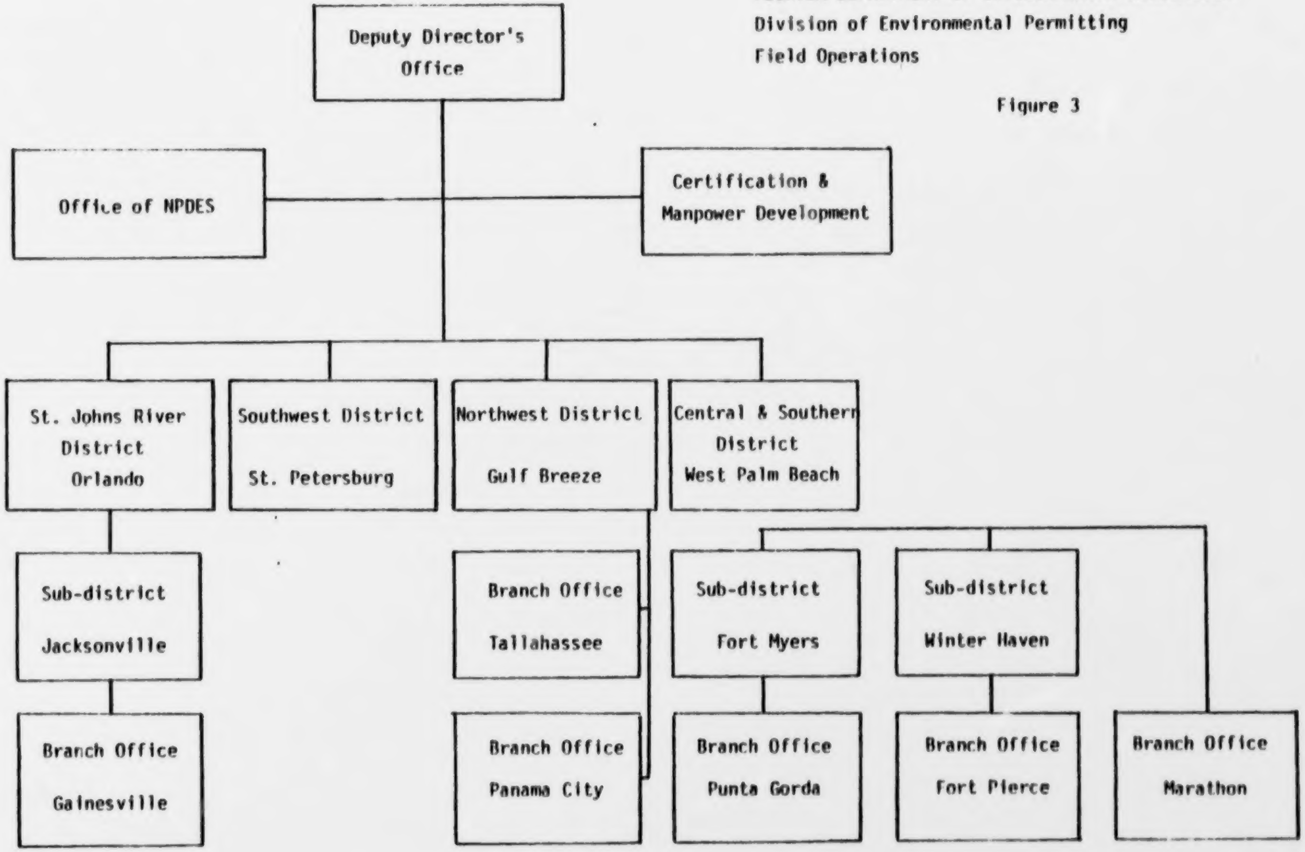
FLORIDA DEPARTMENT OF ENVIRONMENTAL REGULATION
Division of Environmental Programs
Bureau of Air Quality Management

Figure 2


Chief's Office
Planning and Strategies Section
Evaluation and Analysis Section
Air Data Measurement & Quality Assurance Section

FLORIDA DEPARTMENT OF ENVIRONMENTAL REGULATION
Division of Environmental Permitting
Field Operations

Figure 3


Deputy Director's Office
Office of NPDES
Certification & Manpower Development
St. Johns River District Orlando
Southwest District St. Petersburg
Northwest District Gulf Breeze
Central & Southern District West Palm Beach
Sub-district Jacksonville
Branch Office Gainesville
Branch Office Tallahassee
Branch Office Panama City
Sub-district Fort Myers
Sub-district Winter Haven
Branch Office Punta Gorda
Branch Office Fort Pierce
Branch Office Marathon

carried out by district offices, while the Bureau of Air Quality Management conducts continuous monitoring through trailers situated in seven cities. Also carried out in the district offices are enforcement activities, such as inspection, notice and technical assistance. The Bureau of Air Quality Management assists in determining needs and priorities of district offices, and issues directives. Also in the Division of Environmental Permitting, the Certification and Manpower Development unit coordinates Visible Emission Schools for persons in the public and private sectors.

Support to the air quality management program is also derived from the DER's Office of General Counsel and Division of Administrative Services. The Office of General Counsel has a staff of attorneys that is responsible for all Department legal work, while the Division of Administrative Services performs such services as providing centralized administrative services, e.g., personnel, purchasing, general services, budgeting and accounting.

The Bureau of Air Quality Management contains three sections: Planning and Strategies, Evaluation and Analysis, and Air Data Measurement and Quality Assurance. During 1976, the Bureau contained the following: one bureau chief, one environmental administrator, seven engineers, one environmental specialist, one meteorologist (EPA assignee), one chemist, two engineering technicians, one electronics technician, and two clerical employees.

In the DER district, subdistrict and branch offices are the following (in person-years): 18.55 engineers, 2.25 environmental specialists, 10.5 environmental and engineering technicians, 1.5 pollution control specialists, 2.6 chemists, .1 laboratory technican and 5.2 clerical employees. In other components of the Division of Environmental Permitting (Enforcement, Office of Field Operations and Certification and Manpower Development) are the following positions, again in person-years: .24 administrator, 1.74 engineers, .35

environmental specialist, .5 training specialist, .44 administrative assistant and .86 secretary.

Approximately one-fourth of all engineers involved in the air program are registered professional engineers. Chemical and mechanical engineers are preferred. Environmental specialists have at least bachelor-level degrees in a science field. Technicians are typically high school graduates that have been trained on the job. All hiring of new personnel is carried out through the State Merit System.

Information concerning current staffing levels was obtained through interviews with sources in the field, and from information contained in the DER document dated August 1, 1976, entitled, "Department of Environmental Regulation Manpower Allocation". The following table depicts the above staffing level information in tabular form, and all workforce numbers are depicted in person-years. The actual number of persons in each Division engaged in air pollution control activities may be higher than the numbers suggest.

TABLE I

FLORIDA DEPARTMENT OF ENVIRONMENTAL REGULATION

Air Pollution Control
Current (1976) Staffing Level

Department/Position		1976
Office of General Counsel		
Attorney		1.75
Other		.50
Division of Administrative Services		
Technician		1.00
Other		.50
Division of Environmental Permitting		
Engineer		20.29
Scientist		6.70
Technician		10.60
Other		7.24
Division of Environmental Programs		
Engineer		7.00
Scientist		3.00
Technician		3.00
Other		4.00
	TOTAL	65.58

Based upon surveys of selected local pollution programs in Florida, the workforce make-up for air programs is similar to that at the State level. Engineers predominate, while scientists, technicians and administrative personnel are also utilized. The following table depicts local pollution control programs engaged in air pollution control activities and person-years of effort currently expended toward the field (information extracted from "Local Pollution Control Programs Budget Summary - FY 1975-76"):

TABLE II
STATE OF FLORIDA
Local Air Pollution Control Programs
Current (1976) Staffing Level

Program	1976
Alachua County Pollution Control District	5.0
Brevard County Environmental Health Dept.	.59
Broward County Pollution Control Dept.	12.50
Dade County Pollution Control Dept.	12.00
Duval County Pollution Control Dept.	20.00
Hillsborough County Environmental Protection Commission	25.50
Manatee County Pollution Control Dept.	7.00
Palm Beach County Division of Environmental Sciences and Engineering	10.00
Pinellas County Dept. of Environmental Management	8.00
Reedy Creek Pollution Control Dept.	.75
St. Petersburg Environmental Affairs	4.00
Sarasota County Environmental Control Board	4.77
Seminole County Dept. of Environmental Services	.13
Volusia County Environmental Control Office	.40
TOTAL	110.64

During 1976, Florida contained 435 major installations, or facilities capable of emitting over 100 tons of pollutants each year. This represents approximately 10% of all major installations in Region IV. On June 30, 1976, 407 of these were in compliance with respect to emission limits and/or compliance schedules, 26 were in violation and the status of two was unknown.

State sources indicate that air pollution problems occur from six main industrial concerns: power, sugar, pulp and paper, phosphates, citrus processing and construction (asphalt and cement plants). Input from the public and private sectors indicates that nearly all major installations employ at least one person for air pollution control, and may have as many as six. The most reasonable estimate seems to be that each facility employs an average of two persons for air pollution control, for a total of 870 in the State. Staffs currently principally consist of engineers and chemists, who in many cases also perform other environmental functions.

Minor sources rarely retain staffs for air pollution control, but rather meet requirements with the assistance of private consulting firms. State sources estimate that there may be 50 consulting firms that offer services in the field of air pollution control in the State. These firms offer design, installation, testing and maintenance functions, and while some specialize in air pollution control, others offer these services as a portion of overall environmental and non-environmental functions.

In sum, it appears that there are in excess of 1,000 persons in Florida engaged in the field of air pollution control, perhaps reaching 1,300. According to field research, the majority of these persons (an estimated 85%) are in the private sector, and often service the field on a part-time basis.

C. Workforce Projections

During 1976, DER prepared a budget request for Fiscal year 1977-78. For Air quality control, the following personnel requests were made:

1) Air data measurement and quality assurance: two engineers and one chemist;

2) Air planning and strategies: one engineer and one secretary;

3) Air sampling, permitting and enforcement function increases in districts: 18 engineers;

4) Air quality evaluation and analysis: one environmental specialist and one meteorologist;

5) Improvement of air quality management program: three chemists.

Special funds were also requested to continue funding of an expiring EPA grant for expanding computer services for air quality modeling and maintenance planning, for the provision of opportunity to attend related courses, conferences and seminars, and for the provision of a mobile automatic monitoring vehicle to document the ambient air. DER sources indicate that the State Legislature will probably not grant the requested funds for personnel or programs because of its current stringent budget policy. Rather, the number of granted positions will probably be within the range of zero to ten.

Officials will continually request those positions not granted for Fiscal Year 1977-78 during subsequent legislative sessions, which would add 28 additional positions. DER sources estimate that by 1982, the number of persons in air programs will be approximately 150% of its current (1976) level, for a total of approximately 99 positions.

The following table depicts the projected workforce levels for air programs within the DER, based upon best professional estimates of administrators in the field. Current levels are rounded to the nearest whole number.

TABLE III

FLORIDA DEPARTMENT OF ENVIRONMENTAL REGULATION

Air Pollution Control
Workforce Projections to 1982 (est.)

Position	1976	1977	1978	1979	1980	1981	%/annum turnover (ave.)	%/annum growth (ave.)
Engineer	27	32	36	41	45	50	15%	13%
Attorney	2	2	2	2	2	2	n/a	0%
Scientist	10	11	13	14	16	17	10%	11%
Technician	15	15	15	16	16	16	15%	1%
Other	12	12	13	13	14	14	10%	3%
	66	72	79	86	93	99		8%

The turnover rate is estimated to be higher in the Air Quality Management Bureau than in the district offices. Engineers and technicians have typically demonstrated the highest turnover rate. The high rate for engineers is attributed to the fact that engineers are in demand at the present time and can easily obtain more lucrative employment in the private sector. Industries are beginning to utilize technicians to a greater degree, and also often recruit trained technicians from the state agency.

Input from state personnel, local agencies, and officers of the Florida Local Environmental Regulation Association indicates that growth in air programs will occur in local programs, chiefly due to two factors: a) three new local programs may soon be organized, and possibly more within five years, and b) the expansion of monitoring sites. It is commonly agreed that the total air program workforce may grow by approximately 10 percent annually.

The following table depicts projections for local air pollution programs. Current figures have been rounded, and professional breakdowns for both current and future levels are estimates.

TABLE IV

STATE OF FLORIDA

Air Pollution Control
Workforce Projections to 1982 (est.)

Position	1976	1977	1978	1979	1980	1981	%/annum turnover (average)	%/annum growth (average)
Engineer	44	49	58	63	70	76		12%
Scientist	28	31	36	39	43	48		11%
Technician	22	24	29	32	35	38		12%
Other	17	18	21	24	26	29		11%
TOTAL	111	122	144	158	174	191	n/a*	11%

*Attempts have not been made to estimate the average annual turnover rate because field research has shown a great variance between programs, dependent on many factors, including salary structure and chances for advancement.

Field research has not uncovered projections for significant workforce growth for air pollution in the private sector, with the possible exception that industries will tend to make more use of technician level personnel as they are available. For the most part, regulations will be met by existing staff, and with the continued use of private consulting firms, of which there seems to be an adequate supply for current and future needs.

D. Training and Certification

Much of the employee training in the past several years for DER air program personnel has been carried out in-house because of State budget cutbacks and the introduction of tuition changes for EPA courses. District engineers are responsible for training technicians informally on the job, which lasts approximately one year. Sources indicate that most technicians quit after this period of time to work for private industry. These technicians receive no formal training during State employment nor do lower level engineers and scientists, because of the budget restrictions. Higher level professionals are occasionally sent to EPA courses offered by the Air Pollution Training Institute of Research Triangle Park. During Fiscal Year 1975-76, seven persons from Tallahassee and the district offices attended such courses, whereas in previous years, a greater number was able to attend. Professionals also are able to occasionally attend technical conferences. During Fiscal Year 1973-74 DER contracted with the University of Florida to conduct related courses for district personnel, and at least six courses were offered in each office, and 120 to 150 persons received training. This activity ceased, again because of budget restrictions. DER officials participate in the Southeastern Air Pollution Control Training Committee that was formed by Region IV EPA.

Local officials have also of necessity reduced formal training to air pollution employees because of budget reductions and high tuition rates.

Records of the Air Pollution Training Institute, entitled "Final Cumulative Analysis for Fiscal Year 1976" indicate that four local programs sent personnel to Institute classes during that fiscal year, for a total of twelve participants. These agencies are also relying more heavily upon on-the-job training.

The Certification and Manpower Development component of DER's Division of Environmental Permitting conducts a Visible Emissions Evaluation School four times per year in Orlando for State and local officials, and for persons in the private sector. Recertification for regulatory officials is required every six months. Each school lasts 2½ days, one day of which is spent in classroom training. The remaining day and a half is spent toward evaluation and demonstration of competency. The number of participants varies greatly with each session, and the number attending a session in November of 1976 was 132. During the past several years, the number attending the schools from the private sector has surpassed the number attending from the public sector, and the State may begin imposing tuition charges for nonregulatory personnel.

E. Career Potential

Officials in the field do not foresee any new or unique careers emerging in the field of air pollution control in Florida. In the public sector, increasing numbers of engineers, scientists and technicians are projected. Opportunities for engineers and technicians should be best as the supply of trained persons of these levels is currently not meeting the demand. While industries utilize all three types of personnel, the most significant career potential appears to be for trained technicians for monitoring and stack testing.

F. Conclusion

Florida's air pollution control program in the Department of environmental regulation currently requires additional personnel to carry out all required functions effectively. However, State budget constraints are preventing the program from staffing to its required level. If the program is adequately staffed within five years' time, the 1982 staffing level should be approximately 150% of its current level. Budget constraints have also of late significantly reduced the amount of technical upgrade training offered to employees. Officials indicate that this situation could severely handicap the program.

Local programs are facing similar problems at the present time, also because of budget restrictions. An approximate overall annual 10% workforce increase is projected. The State and local agencies will continually utilize engineers, scientists and technicians.

Significant workforce increases in the private sector are not forecast. However, industries appear to be utilizing the services of technicians to a greater extent, often recruiting from State and local agencies after the on-the-job training process has been completed.

II. NOISE

A. Introduction

In 1971, the Florida legislature amended the State Environmental Code, Chapter 403, to make all of its provisions available for the abatement and elimination of noise pollution, and legislative support continued in subsequent years. A survey of noise complaints, conducted by the Florida Department of Pollution Control (now the Department of Environmental Regulation) in 1973 showed that 50% of all complaints related to motor vehicles alone. In response, the Florida legislature passed the Motor Vehicle Noise Prevention and Control Act in 1974. The purpose of the Act is to improve the quality of life in Florida through limiting the noise of motor vehicles in the State. The law contains three major components: new vehicle standards, operating noise limits, and replacement equipment certification. Among the provisions of the Act are the following:

1) New motor vehicles that produce a maximum sound level in excess of specified levels are prohibited from sale in Florida;

2) Manufacturers must certify that their vehicles sold in Florida meet these levels or their vehicles cannot be registered with the Department of Highway Safety and Motor Vehicles;

3) The sale of mufflers or other noise abatement devices that increase the sound level above that of the motor vehicle as originally manufactured is prohibited;

4) Manufacturers of the above equipment must certify that they comply with the law as of July 1, 1977;

5) No vehicle may be operated on the highway with noise levels above specified limits, according to speed and vehicle type;

6) No person may modify or operate a vehicle at a noise level above that as originally manufactured.

The Department of Environmental Regulation is responsible for overseeing the program and implementing the new vehicle and replacement equipment regulations. Moving vehicle regulations are enforced by Highway Patrol officers and county and local police officers.

The lead environmental agency prepared a plan for implementing the Act. Measurement and testing procedures for determining compliance with the Law were established, six Florida Highway Patrol troopers were put through an eighty-hour training course on the fundamentals of sound and enforcement procedures, and these troopers contacted the State attorneys to brief them on the new program and to answer questions. A public awareness campaign was initiated in 1974, and on-the-road enforcement was initiated in March of 1975. The new vehicle certification program also began in 1975. Baseline data collection on individual vehicle sound levels and overall highway traffic noise began in 1974, prior to the effective date of the law. The lead agency's noise program designed a methodology to evaluate alternative effectiveness, involving collection, reduction and modeling.

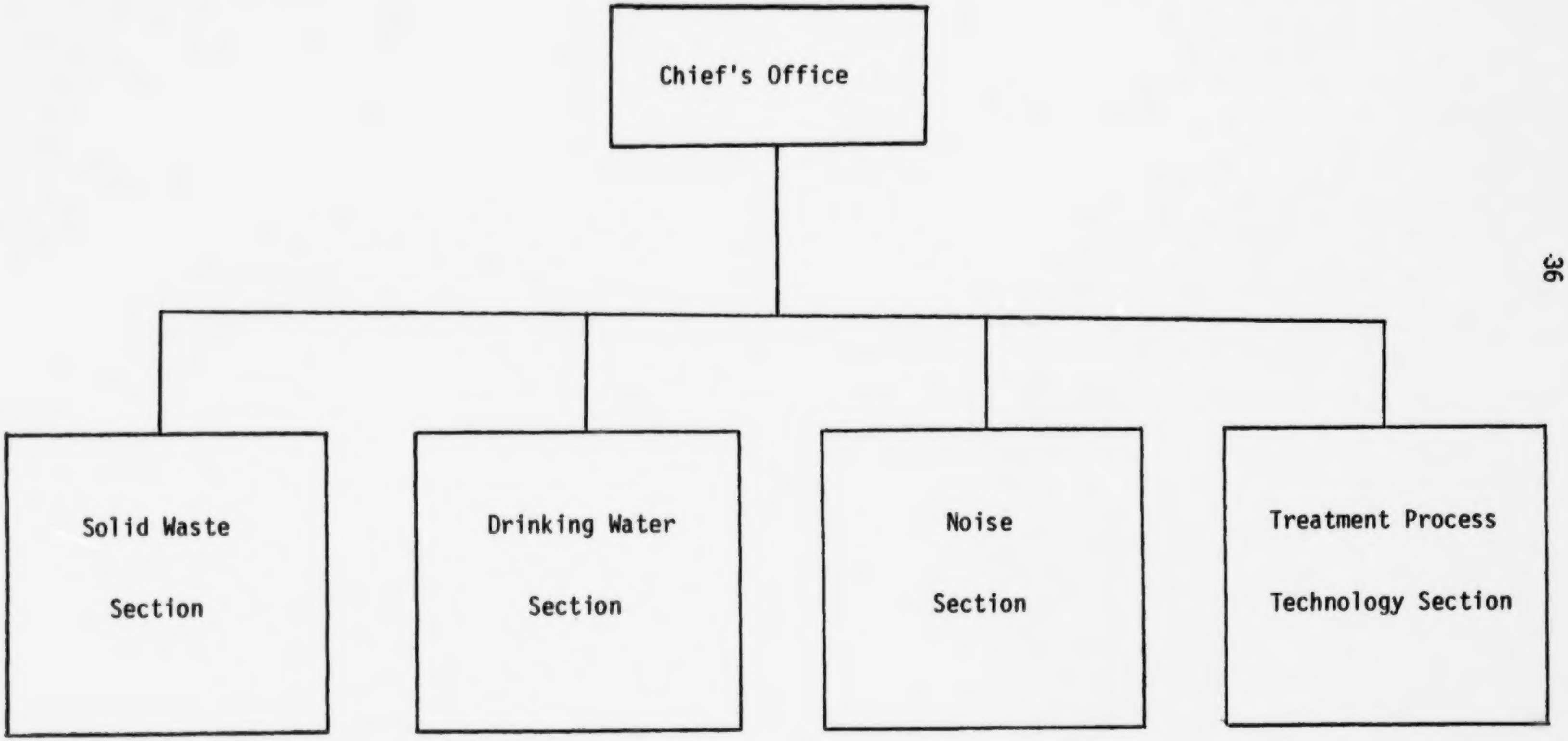
The Department of Environmental Regulation also has contracted with five universities to provide technical assistance to cities and counties in developing noise programs. At the present time, seven local environmental agencies address noise pollution control, as do about seventy local law enforcement agencies.

B. Workforce Profile

The noise control program is carried out by the Noise Section, Bureau of Drinking Water and Special Programs of the Department of Environmental Regulation (DER). During 1976, the Section contained two persons, a

FLORIDA DEPARTMENT OF ENVIRONMENTAL REGULATION
Division of Environmental Programs
Bureau of Drinking Water and Special Programs

Figure 4


Chief's Office
Solid Waste Section
Drinking Water Section
Noise Section
Treatment Process Technology Section

decrease of two from the previous year because of State budget cutbacks. No persons in the DER's district offices at the present time provide services in the field of noise. In addition to administering the sound level certification programs for new motor vehicles and mufflers, promulgating vehicle noise regulations, and training law enforcement officials in vehicle noise enforcement, the Section develops overall goals for the State since many localities do not have ordinances. The Section has cooperated with the five contracted universities to provide technical assistance to over 66 cities and 16 counties in Florida, and training local officials in noise control. The five universities are:

The University of West Florida
The University of South Florida
Florida Technological University
The University of Florida
Florida Atlantic University

Section personnel estimate that an average of two professors and two graduate students participate in this program for each university, for a total of about 20 persons. A paper entitled "Local Noise Programs in Florida", prepared by the Noise Section in 1974, cites the responsibilities of these persons as follows:

1) To review existing noise ordinances and recommend modifications, additions and other changes to meet specific needs of a city;
2) To advise on the content and scope of a new ordinance, if none is in existence;
3) To conduct specialized noise surveys and analyses to develop numerical limits for invorporation into ordinances;
4) To train enforcement personnel in the proper use of measuring equipment, once a method of enforcement is defined.

The lead agency initiated a survey of local noise programs in 1975. The inventory was sent to 459 local governments, and the staff determined from the responses that 18% of the counties and incorporated municipalities had or were developing ordinances. These ordinances were concentrated in higher population areas, and represented a wide variety of approaches. The results are depicted in "Local Noise Programs in Florida" and are summarized as follows (note that several categories of control may be in effect in a single county or municipality):

TABLE V
STATE OF FLORIDA
Summary of Local Noise Ordinances (1974-75)

	Number *				
Category	A	B	C	D	Total
Nuisance	17	9	36	0	62
Zoning	22	8	1	0	31
Building Code	1	0	0	0	1
TOTAL	40	17	37	0	94

* A = Ordinances in force that contain acoustical criteria
B = Drafted ordinances that contain acoustical criteria
C = Ordinances in force that do not contain acoustical criteria
D = Drafted ordinances that do not contain acoustical criteria

According to information provided by the Department of Environmental Regulation, seven local pollution control agencies are involved in noise control. These are:

Agency	Person-Years For Noise (1975-76)
Broward County Pollution Control Department	.35
Duval County Pollution Control	1.00
Hillsborough County Environmental Protection Commission	.50
Pinellas County Dept. of Environmental Management	4.00
St. Petersburg Environmental Affairs	3.30
Sarasota County Environmental Control Board	.60
Seminole County Department of Environmental Services	.03
TOTAL	9.78

This figure may represent as many as 25 persons involved in noise control, whose combined efforts represent 9.78 person-years, according to sources.

Based upon input from State and local officials, those in the field are technical and professional personnel who have often acquired their knowledge in the field from seminars, workshops and short courses. Supplementing these efforts are the enforcement duties carried out by 260 state and local law enforcement officials that have been trained in the field.

The following table depicts approximations of the numbers of persons currently dealing in noise control in the State, mostly on a part-time basis.

TABLE VI

STATE OF FLORIDA

Current (1976) Noise Workforce Level for the Public Sector (est.)

	1976
Department of Environmental Regulation	2
State Universities	20
Local Programs	25
Law Enforcement Officials	260
TOTAL	307

State sources are aware of three university professors that provide private consulting services, and of one other private firm that has expertise in noise control. Sources are unaware of any industries in the State that retain staff for environmental noise control. Few industries in Florida cause noise pollution problems, and the numbers of noise complaints caused by industry are minimal, according to a State survey.

C. Workforce Projections

For Fiscal Year 1977-78, DER has requested an environmental specialist and an environmental administrator. Staff of the Noise Section indicate the chances are practically nonexistent that these positions will be obtained. Training of staff persons in DER's district offices will be carried out late in 1977 by the Noise Section if money for obtaining the required noise meters is granted. These persons will provide noise monitoring and enforcement as a small part of their overall job duties.

Five-year projections for noise control in DER provide for a total of four or five persons in the Noise Section for dealing with new product regulations, motor vehicle certification, technical assistance to local programs, research and development and training. Persons will be required to have a bachelor- or master-level degree and environmental experience. In the district offices, Noise Section officials project that one or two environmental specialists in each office will be assisting with the noise program part-time. These persons should be also degreed, with environmental backgrounds. The number of positions actually acquired depends on several factors, including future State budgets and federal support.

The Environmental Protection Agency has recently contracted with the DER to study the effectiveness of federal motor carrier regulations. Equipment has been purchased, and a mobile van has been ordered. Noise Section staff will ascertain speeds, weights, and sound levels of vehicles, and analyze the data that is gathered. Monitoring will be conducted at highway weigh-in-motion stations. Additional personnel will not be hired as a result of this project.

The number of law enforcement officers trained in noise control and providing enforcement is expected by State personnel to grow slowly during the next five years. Additional persons in universities may become involved in the field of noise control, and sources indicate that the number may double within five years.

Input from the State program and local programs indicate that the number of persons in local agencies for noise control will at least double by 1982. Programs with noise staffs will increase workforce levels in some cases, and a number of local pollution control programs that presently do not deal with noise pollution control are planning to implement such programs and in some cases hire staffs. Reasons for local program expansions include increasing public awareness, and the availability of program guidance.

The following table depicts projections of future workforce levels in noise control for the public sector, based upon feedback from State and local officials:

TABLE VII

STATE OF FLORIDA

Public Sector
Workforce Projections to 1982 (est.)

	1976	1982
Department of Environmental Regulation	2	11
State Universities	20	40
Local Programs	25	50
Law Enforcement Officials	260	290
TOTAL	307	391

In the private sector, it is anticipated that some industries may require on-staff capabilities for environmental noise control. The number of consultants may increase for assisting industries and local officials.

D. Training and Certification

Through the Noise Section, four-day courses have been offered for law enforcement officers throughout the State, with 260 trained by the end of 1976. Course content has included sound theory, measurement techniques, and enforcement policies. Training is also conducted for local officials in community noise control. The course lasts two to three days, and by the latter part of 1976, approximately 200 persons had been trained.

In conjunction with the Florida Department of Transportation, the Section has coordinated seminars dealing with the fundamentals of highway noise and approximately 100 persons have attended. A two-day workshop was held during 1975, at which time model noise ordinances were released. Eighty persons were in attendance. Technical assistance for previously-mentioned programs were provided by the contracted universities, and professors have often conducted the training.

For DER district personnel that will perform noise control services, the Noise Section will offer a three-day course on the fundamentals of sound and noise, environmental effects, noise measurement procedures, instrumentation, existing legislation and control strategies. Courtroom demeanor will also be a part of the program.

E. Career Potential

At the State level, officials project that opportunities may develop for bachelor-and master-level persons with environmental experience and coursework in noise and acoustics. Demands should increase for similarly trained persons in local agencies, as well as for technical personnel in monitoring. While demands for trained persons in industries may not increase, projections suggest an increasing market for private consultants with high degrees of expertise in the field.

F. Conclusion

Florida State laws currently allow for regulation of environmental noise stemming from motor vehicles, the State's largest single cause of noise pollution. At the local level, approximately 18% of the State's counties and municipalities control, or are planning to control, noise through local noise ordinances; these areas include 75% of the State's population.

The State program administers the motor vehicle noise program and provides assistance to localities in developing and implementing noise programs, with assistance from five state universities. State sources believe that the field of noise control will grow rapidly during the next five years, and workforce growth will occur at the State level, at the local level, and in the private sector. Training needs will partially be met through seminars and workshops that will continue to be sponsored by the State. However, sources indicate a growing need for vocational, undergraduate and graduate courses in the field of noise.

III. PESTICIDES

A. Introduction

The enforcement of the "Florida Pesticide Law of 1974" is charged to the Florida Department of Agriculture and Consumer Services. Since 1969, however, Florida law has defined and controlled restricted pesticides. Sellers and dealers were required to be licensed by the Department, and purchasers, users and possessors were required to be permitted. The restricted-use list, which became effective in 1970, contained 35 individual chemicals and their families. An amendment was made in 1970 which provided definitions of twelve persistent pesticides, several of which were on the restricted list. These were restricted to spot use only, unless there were no other safe or effective products available.

The 1974 pesticide law, then, required that all applicators of restricted and persistent pesticides be certified by the Department. As the federal list of restricted-use pesticides is not finalized as yet, the State is using its own list for the present.

Formed under the Act is a Pesticide Technical Council composed of twelve members from various State agencies and institutions, and one member from a pesticide manufacturing firm. This Council was created to consult with, advise, and make recommendations to the Department of Agriculture and Consumer Services with respect to policies, rules, and regulations pertaining to the field of pesticides. Also formed was a Pesticide Application Council, composed of the members of the Pesticide Technical Council and two certified commercial applicators. This Council also serves in an advisory capacity.

The Governor appointed an Interagency Committee, composed of representatives from the Department of Agriculture and Consumer Services, the Department of Environmental Regulation, the Department of Health and Rehabilitative Services, the Institute of Food and Agricultural Sciences, the Game and Freshwater Fish Commission and the Department of Administration. This committee developed the "Florida State Plan for Certification of Commercial and Private Applicators of Restricted Use Pesticide" under the provisions of the Federal Insecticide, Fungicide and Rodenticide Act as amended.

The Division of Inspection, Bureau of Feed, Seed, Fertilizer and Pesticide is the unit of the Department of Agriculture and Consumer Services that is charged with the responsibility of unification of the plan into a workable unit. To do so, the Department entered into formal agreements with four State agencies, that each assume certain functions and responsibilities. These agencies are:

1) The Department of Health and Rehabilitative Services (HRS)
2) The Department of Natural Resources (DNR)
3) The Department of Pollution Control (currently the Department of Environmental Regulation)
4) The Institute of Food and Agricultural Sciences (IFAS)

In addition, the Division of Chemistry of the Department of Agriculture and Consumer Services is charged with conducting the laboratory analyses required for enforcing the State and Federal laws. The Department of Environmental Regulation and the Department of Transportation are available to the Division of Inspection for review of training materials and examination topics associated with pollution control regulations and right-of-way applications.

To combat problems associated with the disposal of pesticide containers, a Pesticide Container Disposal Committee has been formed at the University of Florida. The current major project of this committee is to perform air monitoring of pesticide container burning in Dade County. Because the water level is extremely high in this area, containers cannot be buried, and the situation is becoming critical regarding their disposal. If burning proves environmentally feasible, the process will be applied statewide.

A "Pesticide Illness Verification and Training Program" is being sponsored by the University of Miami under the direction of Dr. John E. Davies. This program focuses on the coordinated involvement of migrant farm clinic staff in pesticide intoxication identification and verification. The resultant data will not only serve in confirming the incidence among migrant farm laborers, but will also provide a statistical model for problem assessment on a national scale.

B. Workforce Profile

The Department of Agriculture and Consumer Services is responsible for coordination of the State Certification Plan, registration of restrited-use pesticides, enforcement of the Florida Pesticide Law, and the certification of all commercial applicators except in the following areas: ornamental and turf, general household pest and rodent control, termite and other infesting organism control, and fumigation. Within the division, eight full-time people work in pesticides: an administrator, a clerk V in charge of registration, a clerk IV and five clerk-typists. In addition, 38 field inspectors are located throughout the state who spend approximately 25% of their time in pesticide activities. These inspectors provide enforcement functions, and the position requires a bachelor's degree with major coursework in agriculture and one year of experience in processing or merchandising feed or fertilizer.

The Office of Entomology, Department of Health and Rehabilitative Services, is concerned with administering and enforcing the Pest Control Act, Chapter 482, Florida Statutes, and with providing matching funds, aid and advice to mosquito control districts and counties under Chapter 380, Florida Statutes. The office also gives examinations and certifies individuals to use restricted pesticides in the following categories: Ornamental and Turf, Structural and Health Related Pest Control, and Public Health Pest Control. Two entomologists have primary responsibility for writing and administering certification examinations in these categories, and ten other entomologists assist as the need arises. In addition, eight entomologists participate in projects at the offic's research laboratory in Panama City that often include testing the efficacy of pesticides against specific insects.

Aquatic pest control applicators are trained and examined by the Department of Natural Resources. The department also assists in regulating enforcement activities, and employs a coordinator, assistant coordinator and eight to ten specialists that assist in training. These people come mainly from the fields of chemical weed control, plant taxonomy, and agricultural engineering. Six regional field botanists, also, are employed by the Game and Freshwater Fish Commission and are responsible for the surveillance of the application of pesticides to waterways. These people also serve an extension function, working with local officials and homeowners regarding pesticide application to waterborne plants.

Training of applicators and conducting examinations is performed by the Institute of Food and Agricultural Sciences of the University of Florida for all private applicators and for those commercial applicators not regulated by the Department of Health and Rehabilitative Services and the Department of Natural Resources. A Pesticide Chemical Coordinator coordinates all activities associated with the training and examination of commercial and private applicators. In addition, assisting in the training of commercial applicators are seven entomologists, four plant pathologists, one weed science specialist, one nematologist and one agricultural engineer. In addition, these people have trained 125 extension pesticide trainers (county agents) who, in turn, provide pesticide application training to private applicators. Six scientists make up the "Pesticide Program Steering Committee" that serves as a consultant for the preparation and presentation of training materials and programs. Assistance in training has also been provided from such sources as the U.S. Fish and Wildlife Service, the U.S. Environmental Protection Agency, the Florida Department of Health and Rehabilitative Services, and the Florida Department of Agriculture and Consumer Services.

The State Chemical Laboratory of the Department of Agriculture and Consumer Services has two pesticide laboratories: a pesticide residue lab and a pesticide formulation lab. The former employs twelve degreed chemists and seven non-degreed technicians, while the latter employs four chemists and five technicians. Technicians are high school graduates with experience in analytical laboratories. While personnel in the formulation lab perform functions strictly in relation to pesticides, those in the residue lab perform a small amount of analytical work relating to drugs and heavy metals.

The Division of Inspection places a conservative estimate on the number of applicators requiring certification at 5,000 commercial and 16,000 private applicators. Commercial applicators are certified in the following major categories:

Agricultural Pest Control
Forest Pest Control
Ornamental and Turf
Seed Treatment
Aquatic Pest Control
Right-of-Way Pest Control
Industrial, Institutional, Structural and Health Related
Regulatory Pest Control
Public Health Pest Control
Demonstration and Research
Aerial Application

Estimates of the total numbers by category are not presently available for all classifications, although the Division of Inspection is currently researching the field to obtain estimates of this nature. Department of Natural Resources officials indicated that by the end of 1976, approximately 700 persons had attended training for aquatic plant control. It is estimated by these officials that approximately 100 more persons will require training in this category. Similarly, the Office of Entomology at HRS has certified 214 persons in the Public Health Pest Control Category and 1,637 in the Industrial, Institutional, Structural and Health Related Pest Control and the Ornamental and Turf categories. If there is a total of 5,000 commercial applicators requiring certification, approximately 3,263 fall into all other categories. However, it should be kept in mind that the total number of certificates issued does not necessarily represent the total number of applicators, as many persons become certified in two or more categories. All applicators, commercial or private, of restricted pesticides in the state that are regulated by the Department of Agriculture and Consumer Services, including supervisors and crew personnel, must become certified by October 21, 1977. However, receipt of a certificate for those controlled by HRS enables the applicant to be in charge of and supervise pest control activities in the appropriate category. The Division of Inspection

The Division of Inspection extimates that at least 16,000 private applicators will require certification in the state.

The total estimated pesticide and pest control picture is reflected in the following table in which figures are approximations of the workforce engaged in pesticides on either a full- or part-time basis.

TABLE VIII

STATE OF FLORIDA

Pesticides Public and Private Sectors
Current (1976) Staffing Level

Public Sector		1976
Department of Agriculture and Consumer Services		
Division of Inspection		46
Division of Laboratories		28
Department of Health and Rehabilitative Services		20
Department of Natural Resources		12
Institute of Food and Agricultural Sciences		
Pesticide Steering Committee		6
State Extension		11
County Extension		125
Game and Freshwater Fish Commission		6
	TOTAL	254
Private Sector		
Farmers		16,500
Owners/Operators/Applicators		5,000
	TOTAL	21,500

In addition to the above, chemical companies occasionally become involved in applicator training, although total numbers involved are not readily available. These private firms also become involved in experiments for testing the viability of usage of certain products in the state.

C. Workforce Projections

Within the Division of Inspection it is anticipated that one field supervisor and seven field inspectors will be required within the next several years for continuation of existing program. After these additions, it is not felt that additional workforce will be required, as registration and enforcement workloads should stabilize unless new regulations are formulated. New field inspectors will also perform investigative functions in the areas of feed, seed and fertilizer and will spend approximately 25% of their time in pesticides.

Workforce increases are not projected for the next five years in any other agency involved in pesticide control: HRS, DNR, IFAS or the Division of Laboratories. Functions pertaining to aquatic pest control, however, may be transferred to the IFAS/University of Florida research laboratory in Fort Lauderdale, with continued assistance from DNR. Numbers of persons involved, however, are not expected to change significantly. After October 21, 1977, the numbers of staff personnel involved in training in IFAS and by county agents may not decrease, although the amount of time spent by each person for pesticide training may decrease. Turnover for all agencies is very low, approximately three to five percent annually.

Estimates pertaining to applicator workforce growth rates are not readily available for all categories. However, HRS officials estimate that 25 or fewer persons per year will seek certification in the category of Public Health Pest Control after 1977. Approximately 350 new certificates are issued per year for the categories of Industrial, Institutional, Structural and Health Related Pest Control and Ornamental and Turf. However, nearly 300 of these are allowed to lapse, so the growth rate is approximately 50 per year, which is not expected to change.

According to state sources, the greatest amount of growth in commercial operations is expected in the area of aquatic plant control. Officials at the Department of Natural Resources project a need for doubling of workforce every two years, particularly for the control of hydrilla verticillata. This plant is becoming a great problem in the state and is extimated to cover about 200,000 acres of water in the state, or approximately 10% of the water system. This large a growth may not occur, however, as many of these applicators work for public agencies with limited budgets.

From the above information, 1982 workforce levels are estimated as follows (specific projections for other categories are not available):

Public Health Pest Control	339 (maximum)
Industrial, Institutional, Structural, and Health Related and Ornamental and Turf	1,887
Aquatic Weed Control	4,800

D. Training and Certification

The Cooperative Extension Service of IFAS offers training for private and commercial applicators, though applicators have the option of learning the material through self-study. Training is held in several locations throughout the state and consists of two phases: a general (core) phase and a specific (category) phase. Each total session lasts two to three days. The program presentations include lectures, demonstrations, slide reviews and questions and answer sessions. Each participant receives a training book containing core and category manuals, 24 color identification sheets of insects and diseases, and weed manuals. These materials are also available upon request to any commercial applicator not attending a training session. The passage of a written examination, consisting of multiple choice, fill-in-the-blank, true-false and short answers is required for any applicator to become certified by the Division of Inspection.

Training to private applicators will be provided by county agents under the direction of the Cooperative Extension Service. The objectives of the training program are the impartation of information concerning the proper handling and use of restricted pesticides and applicator demonstration of competency in required standards. Procedures used in training include lectures, slide demonstrations and question review sessions conducted by the trainer. Participants receive a Private Applicator Training Pack containing an application and reference materials. Competency is demonstrated by the applicator by his/her completion of a review set of questions based on the information presented in the program. The trainer discusses the correct answers with the applicant, and the review sheet, along with a completed restricted pesticide application is forwarded to the Divison of Inspection for processing and certification. The review sheet is not intended as an examination, but issued as a mechanism used to ensure that each person has demonstrated competency. Provisions have been made for those who cannot read labels.

The rate of all applicator training by IFAS will necessarily decrease after 1977. This agency has developed a proposal for future training of commercial applicators. Under the proposed system, a person desiring training could choose among several alternatives. First, once per year, training for all cateogries will be held at a central location by those currently conducting training. Second, county agents would provide training to commercial applicators by an auto-tutorial method. A third option would be the use of a "caramate system" that has been provided by EPA, to be located in key counties in the State. This is an automated machine-produced training, and county agents would conduct the examinations. The final option would be a method whereby commercial applicators could obtain self-study materials from the county agents offices and return later for examination. Whether this overall system will be adopted is not yet known.

The training program for aquatic applicators was started about three years ago, when three- and four-day schools were held for supervisory personnel. When the certification process began in the State, training was extended to include crew personnel. According to DNR officials, quality was reduced as a result. This type of training is currently offered at approximately six locations in the State. Duties for this type of training will be gradually shifted to IFAS, specifically through the cooperative field laboratory at Fort Lauderdale.

The main source of agricultural education and training in the State is the University of Florida. Two-year agricultural curricula, however, are available at Ocala Junior College and Lake City Junior College. Broward Community College offers a pesticide curriculum. Additional training in the specific field of pesticides is limited at this level.

E. Career Potential

Little workforce growth is expected in the public sector in the next five years, and overall turnover at this level is quite low. However, difficulty is found by State officials in recruiting graduates in the field of agriculture, and persons with this type of background will be actively sought as openings occur.

State officials found it difficult to speculate concerning career potential in the area of application. However, it appears that the greatest employment opportunities will exist in the area of aquatic weed control. Those currently in the field have learned from experience and from DNR training.

However, turnover rates are very high because other southeastern states and the federal government are recruiting these experienced people from Florida, because these skill areas are not readily available from any other sources. According to DNR officials, substantial needs exist and will increase for persons trained at the technician level in aquatic plant control, and at higher levels for supervisory and training functions.

F. Conclusion

Pesticide activities take many forms and are conducted by a number of agencies and institutions in Florida. Workforce growth is not expected to be dramatic in the public sector, although needs that do exist are largely for bachelor-level personnel in the field of agriculture. Projections concerning the number of applicators in future years are not readily available, although State personnel believe that by 1977, after the initial thrust is over for meeting federal and state requirements, information concerning the private sector will be much more easily discerned. From information that is available, however, it appears that the field of aquatic plant control will demonstrate the largest growth rate because of problems occurring with the plant hydrilla verticillata. Such a demand for trained personnel is expected that DNR personnel forecast a definite need for related training at the two-year, four-year and graduate level.

Research and demonstrations are also taking place in the State. A pesticide container burning project with air monitoring is being conducted in Dade County, and application of techniques might be spread statewide. In addition, a pesticide illness verification and training program is being carried out at the University of Miami, focusing activities on migrant health clinics, and being applied on a national scale.

IV. POTABLE WATER

A. Introduction

The legal authority of the existing Florida water supply program is derived from Chapter 381, Florida Statutes, specifically Sections 381.271, 381.281 and 381.293. The authority granted under these laws is limited in scope and covers: 1) review of plans and specifications of water supply systems (381.271); 2) certification of water treatment plant operators (381.293); 3) advice to local health authorities and others regarding sources of water supply; 4) orders to correct a water supply system that constitutes a nuisance or menace to the public health; and 5) review of methods of water purification (381.281).

Florida is expected to assume enforcement responsibilities of the Federal Safe Drinking Water Act, 1977. In order to have full required legal authority, the Florida Department of Environmental Regulation (DER), which carries out the state's drinking water program, has recommended that the state repeal Section 381.271 and 381.281 and enact a new set of Statutes to be entitled the "Florida Safe Drinking Water Act". DER officials expect that this bill will be passed during 1977 by the Florida General Assembly, before primacy of the federal act is assumed. If passed, DER will address specific items in the Federal Safe Drinking Water Act and promulgate suitable regulations patterned after federal regulations.

During 1974, the Water Supply Branch of Region IV EPA prepared the Evaluation of the Florida Water Supply Program at the request of the Florida Division of Health, which at that time administered the state's water supply program. This report documented serious deficiencies in the Florida program and recommended program revitalization and expanded personnel and budget. After the passage of the Federal Safe Drinking Water Act in 1974, the Department of Environmental Regulation, which then housed the program, requested from EPA an update of the evaluation. This report identified a 30% reduction in personnel since the initial report. EPA personnel stated:

> Based upon estimates and assumptions generally accepted for use in projecting State Water Supply Program needs, the State of Florida needs to initiate a phased buildup of Water Supply Program capability over the next 5 to 7 years. Approximately 20 positions should be added yearly to expand staff from the present 22.5 positions to approximately 125. Efforts to obtain services of county sanitary engineers should be pursued. Adequate laboratory capability should be provided.

The overriding problem, then, in developing a viable program to carry out responsibilities for the Federal Safe Drinking Water Act is legislative appropriation of funds to cover the costs of additional positions. The Department is optimistic regarding the Act's enactment during 1977 and is building up program staffing capabilities through the use of federal funds and through an Interagency Agreement with the Florida Department of Health and Rehabilitative Services to provide engineering and laboratory support to the state's program.

B. Workforce Profile

Chief responsibilities for the state's water supply program are carried out within the Bureau of Drinking Water and Special Programs of DER's Division of Environmental Programs. Support to this coordinating unit is provided by the Office of General Counsel, the Treatment Process Technology Section of the Bureau of Drinking Water and Special Programs, and the Division of Environmental Permitting, through its district offices and the training and certification staff. Among the activities of the water supply program are the following:

1) Well permitting: Reviewing site locations and designing specifications shown on permit applications and issuing permits for approved facilities;

2) Operator certification: Testing and licensing water purification plant operators, maintaining records of their certification status, training and experience;

3) Surveillance: Performing sanitary surveys of facilities and reviewing bacteriological and sampling data.

4) Water system approval: Reviewing and evaluating the design and construction of new or modified facilities;

5) Enforcement: Implementing procedures for administrative and judicial enforcement of standards, and granting of variances and exemptions.

During 1976, two persons were in the Drinking Water Section, both professional engineers. Federal funds for an additional seven positions were available but had not yet been cleared through the Florida General Assembly. Approximately three additional person-years of effort were derived from other components of the Bureau of Drinking Water and Special Programs.

Within the Division of Environmental Permitting, 19.08 person-years were expended toward the water supply program during 1976: 16.63 in district offices, 2.16 in training and certification, and .29 in enforcement. These are broken down as follows: .21 administrator, 8.09 engineers, 1.6 environmental specialist, 5.5 environmental technicians, .38 chemist, .25 field inspector, and 3.05 clerical employees.

Within the Office of General Counsel of the Office of the Secretary, during 1976, 1.1 person-years were directed toward the drinking water program: .35 attorneys and .75 secretary.

Approximately 58% of the engineers are registered professional engineers, and most come from sanitary engineering backgrounds. Environmental specialists are college graduates, with science backgrounds. Environmental technicians are chiefly high school graduates that have been trained on the job. Recruitment is carried out through the State Merit System.

Information regarding workforce levels was obtained through interviews with officials in the field and from a DER document entitled: "Department of Environmental Regulation Manpower Allocation" which is dated August 1, 1976. The following table depicts the person-years allocated to the water supply program during 1976, by occupational level. The actual number of persons involved on a full- or part-time basis is necessarily higher. Not included in the chart are unfilled federally-funded positions.

TABLE IX
FLORIDA DEPARTMENT OF ENVIRONMENTAL REGULATION
Potable Water Program Operations
Current (1976) Staffing Level

Department/Position *	1976
Office of the Secretary	
Attorney	.35
Other	.75
Division of Environmental Permitting	
Engineer	8.09
Scientist	2.23
Technician	5.50
Other	3.26
Division of Environmental Programs	
Engineer	2.00
Scientist	1.00
Other	1.75
TOTAL	24.93

* "Other" includes administrative and clerical

In addition to these personnel, nine county health departments with sanitary engineering capabilities by interagency agreement act as agents of the DER district offices within their areas. They handle most of the engineering matters in their areas, but do not issue final permits. Nine sanitary engineers perform these functions, for an estimated total of five person-years. Health departments in the following counties are involved in these efforts:

Brevard County
Broward County
Dade County
Duval County
Hillsborough County
Manatee County
Palm Beach County
Pinellas County
Polk County

During 1976, seventeen county health departments which have bacteriological laboratory capabilities analyzed drinking water samples delivered to them by health department personnel or DER district personnel. Some chemical analyses are also performed. The analyses are also conducted under an agreement between DER and the Department of Health and Rehabilitative Services (HRS). The number of persons involved or the person-years of effort have not yet been ascertained, although under the proposed legislation, HRS will make this determination by February 1, 1979. Laboratories are located in the following counties:

Alachua County
Brevard County
Charlotte County
Citrus County
Duval County
Franklin County
Highlands County
Indian River County
Lee County
Levy County
Manatee County
Marion County
Orange County
Pinellas County
Polk County
St. Johns County
Sarasota County

DER has contracted with HRS to inventory non-community water supplies, which are currently estimated to total at least 5,000. The total number of community systems is estimated by DER officials to be 2,500.

According to Rules of the Department of Environmental Regulation, Chapter 17-16, "Water and Domestic Wastewater Plants Operator Certification", an operator is any person, including the owner, in actual charge of the operation, supervision, or maintenance of a water or wastewater treatment plant. The Rules classify all plants from A through D, and specify the certification levels for lead operators required for each level of plant, and the minimum on-site time required for certified operators. All lead operators must be certified at the level of the plant, or higher, and any person performing the duties of an operator must hold a certificate. Class A is the highest level. "Operator Trainees" are those persons who receive technical instruction in operation, supervision, and maintenance under the direct supervision, and maintenance under the direct supervision of a certified operator not to exceed two years.

The following table depicts DER's estimate of the current number of certified water treatment plant operators, by category:

TABLE X

STATE OF FLORIDA

Current (1976) Certified
Water Treatment Plant Operators

Classification	1976
A	203
B	208
C	1,507
D	16
TOTAL	1,934

C. Workforce Projections

During early 1977, the seven additional positions for the Drinking Water Section were filled. These included the following: three professional engineers, two environmental specialists and two clerical employees. For 1977, six engineers and seven clerk typists have been requested and approved for the district offices.

For the Treatment Process Technology Section of the Bureau of Drinking Water and Special Programs, three positions have been requested for the drinking water program: a professional engineer, an environmental specialist and a secretary. This staff would provide competence in new design technology and special technical assistance in the area of deinking water treatment technology.

Including the DER personnel and sanitary engineers, the number of whom may be increased, in county health departments, officials in the Bureau of Drinking Water and Special Programs estimate that by the end of 1977, the person-years of effort expended toward water supply, excluding laboratory will approach 55, above EPA's recommended levels.

DER has recently reached a new agreement with the Department of Health and Rehabilitative Services to provide all of the required laboratory capability for the State's drinking water program. Under the agreement, HRS will develop a comprehensive program for laboratory capabilities. A central laboratory in Jacksonville will perform analyses and certify all other laboratories. A laboratory in Orlando will provide radiological analysis of drinking water, and the seventeen county health departments currently providing services will continue to do so, at a higher rate. As previously mentioned, it is proposed that HRS will inventory the person-years of effort by February 1, 1979, directed toward the State's program. State sources project that this may be 25 to 50 by the end of 1977. Persons would include laboratory scientists such as chemists and biologists and sanitarians who will be collecting samples.

DER officials feel that if sufficient capabilities are developed in HRS for engineering, sample-collecting and laboratory analyses, as is currently projected, the water supply staff within DER may require few staffing increases beyond its level of 1977. Future in-house staffing needs that may occur will become apparent after the implementation of HRS's program, and after the release of its workforce survey.

State sources predict a growth in the number of certified operators during the next five years, because of increased enforcement of certification laws and an increase in the number of designated plants requiring the presence of a certified operator. Very small supplies will probably tend to hire consulting firms for overseeing operations, although these persons will also be required to be certified. The number of operators at level "C" is projected to increase most rapidly, at 8 to 10% annually, while all other levels are expected to increase at approximately 5% annually.

Based upon the available information, the following table depicts workforce projections to 1982 for certified water treatment plant operators in Florida:

TABLE XI

STATE OF FLORIDA

Certified Water Treatment Plant Operators
Workforce Projections to 1982 (est.)

Classification	1976	1977	1978	1979	1980	1981	%/annum turnover (average)	%/annum growth (average)
A	203	213	224	235	247	259		5%
B	208	218	229	240	252	265		5%
C	1507	1643	1791	1952	2128	2320		9%
D *	16	17	18	19	20	21		5%
TOTAL	1,934	2,091	2,262	2,446	2,647	2,865	25%	8%

*While straight-line projections have been depicted, officials indicate that when the Phase II-enforcement poll period of the implementation of the Safe Drinking Water Act begins, a sharp rise in the certification of Class "D" operators may occur.

While State sources have estimated the annual operator turnover rate to be 25%, many of those included in this figure do not actually leave the profession. Rather, operators are exhibiting a high rate of mobility among plants, as mandatory certification has afforded a greater number of career opportunities for certified operators.

D. Training and Certification

On-the-job training is offered to new entrants to DER's potable water program if these persons have not had previous experience in the field. Whenever possible, administrators recruit from within DER, or other State or local agencies. Technical upgrade training opportunities are not abundantly available, although select persons occasionally attend EPA short courses or conferences of the American Water Works Association.

The DER does not have the authority to conduct training for water treatment plant personnel. The Certification and Manpower Development component of the Division of Environmental Permitting is responsible for the certification of water and wastewater treatment plant operators and well drillers. DER presently has no authority to regulate operators of wastewater collection and water distribution systems, but plans to request the State legislature for such authority. In administering the certification process, DER sets guidelines and operator qualifications as allowed by legislation, prepares and administers certification examinations. In addition, Certification and Manpower Development staff have established guidelines and approve courses for water and wastewater treatment plant operators. This activity is carried out as a result of a recent rule requiring that operators in Grades A, B and C complete an approved course prior to being certified. Established guidelines for training programs relate to the following: instructors, curricula, instructional equipment, trainee evaluations, records, class sizes, credits toward certification requirements, and follow-up reports.

Minimum curriculum requirements for water treatment operator training courses have been established for approval by the DER Nine major categories have been outlined that must be included in each program, and specific required contents for each category have been defined. The nine major categories are as follows, with classroom hours required per certification level:

TABLE XII

Minimum Curriculum Content for Water

Treatment Plant Operator Training Courses

Approved by the Florida Department of Environmental Regulations

Category	Classroom Hours Required per Certification Level A	B	C
Mathematics	3	8	11
Laboratory and Science	16	18	20
Maintenance	3	7	8
Operations	30	35	43
Personal Development	13	9	10
Health and Safety	6	5	3
Clerical and Recordkeeping	14	12	9
Supervision and Management	28	21	11
Rules, Regulations, Permits and Quality Standards	7	5	5
TOTAL	120	120	120

By the end of 1976, four programs offered by vocational schools and community colleges were approved by the DER for water and wastewater operator training. Only one of these programs included courses for water treatment plant personnel, which offered courses in water management for Grades A, B and C operators. DER personnel anticipate that within several years, 20 to 25 programs at community colleges and vocational schools will be approved by the DER.

In addition to the completion of approved courses for certification in Grades A, B, and C, operators of these grade levels are required to accumulate three (C), eight (B) or twelve (A) years of actual years constructive experience, which must include specified amounts of actual experience in the operation, supervision and maintenance of water plants. Credited toward constructive experience is the participation in related training opportunities. The number of years of constructive experience credited to operators for completion of specific training opportunities are defined in the State rules and regulations.

The Florida Water and Pollution Control Operators Association sponsors one annual short school and eleven regional short schools each year which are recognized as one-half and one-third year's constructive experience, respectively. The annual school is held at the University of Florida in Gainesville and lasts one week. The regional schools are held at local college campuses, and last approximately three weeks. Classes are held several days each week, with a minimum of 12 hours over the three-week period. Approximately 100 operators annually participate in regional schools, while an average of approximately 400 operators attend each annual school.

The Center for Training, Research and Education for Environmental Occupations (TREEO) of the University of Florida's Department of Continuing Education has recently been formed to provide training to persons in environmental fields. The initial thrust will be in the area of wastewater, to be followed by potable water, air, solid waste and other environmental fields. Plans include the development of short courses, seminars, and formalized vocational courses for Class A, B and C operators, the development of instructor training courses and the administration and coordination of problem-solving research in environmental fields.

DER officials indicate that when the projected 20 to 25 vocational curricula are approved and the TREEO center is fully functional, educational and training opportunities will be adequate to meet the State's needs for treatment plant personnel. Moreover, a continuing improvement should occur, as the DER will continually upgrade and refine its guidelines and requirements.

E. Career Potential

Opportunities should occur in the Department of Environmental Regulation and the Department of Health and Rehabilitative Services in the field of potable water for engineers, chemists, biologists, sanitarians and laboratory technicians. Increasing opportunities should be available for operators of water treatment plants, particularly those that have completed the certification process. Demands should also increase for entry level operators, who should find promising career opportunities available through the upgrade process.

F. Conclusion

Florida is scheduled to assume primary enforcement responsibilities of the Federal Safe Drinking Water Act on June 24, 1977. Previous to this time, the State must gain additional legislative authority. The required staffing capabilities are being developed within the Department of Environmental Regulation, principally through the use of federal funds, and through an interagency agreement with the Department of Health and Rehabilitative Services. This agency will provide engineering and laboratory support to the State's drinking water program. Through these means, State officials believe that major staffing needs will be met within one to two years time.

State laws require that operators of water treatment plants become certified. The Department of Environmental Regulation administers the certification program and approves courses and programs for operators. While a substantial increase in the number of operators is projected, state sources predict that available training opportunities will be adequate for meeting needs within several years.

V. RADIATION

A. Introduction

Radiation control functions within the State of Florida are the responsibility of the Florida Department of Health and Rehabilitative Services (HRS). Florida entered into an agreement with the Atomic Energy Commission (now the Nuclear Regulatory Commission) in 1964 to carry out the Commission's regulatory program for the licensing of controlled radioactive materials. The state statute which authorized such an agreement to take place was enacted in 1961 (H.B. 2367). The State's enabling act which authorized the promulgation of radiation control regulations was also enacted in 1961 (Chapter 290) and amended in 1971 (S.B. 670) to allow for the control of non-ionizing radiation.

The Radiological Health Program is located in the Health Program Office, a component of Central Operations Services. The Radiological Health Program is responsible for registering X-ray machines, licensing radioactive materials and users, planning for environmental radiation survellance, providing technical expertise to the Department's field offices, and planning the Office of Laboratory radiation control activities and approving its program plan.

The Office of Laboratory Services is also a component of Central Operations Services that has environmental radiation control responsibilities. The Laboratory carries out environmental surveillance, and inspection/compliance functions. The Laboratory also maintains personnel in the Jacksonville, Orlando and Miami field offices. The Department is considering an internal reorganization which would merge the

Office of Laboratory Services and the Radiological Health Program into one administrative unit.

Ninety percent of the phosphates that are mined in the United States are taken from a ten-county area in central Florida. A severe radiological health problem exists in the area, as radium has been found after acids have been used to remove phosphates from the area. Drinking water absorbs a large amount of radium, and the principal radiological health problem faced in Florida has been to obtain control of the state's drinking water supplies and to perform analytical tests to determine the impact on the public health. The Florida Radiological Health Program presently lacks the capabilities to determine what potential hazards are faced by the presence of radium in the phosphate areas. The Office of Laboratory Services needs to upgrade its capabilities so that drinking water samples can be analyzed for determining the presence of radium. Until this task is completed, the State of Florida will be unable to meet the requirements of the Federal Safe Drinking Water Act. Program officials also feel that there is a need for standard laboratory methodology and sample collection techniques. These could be obtained from using EPA analytical methods so that the analytical results could be compared with those of other states on a uniform basis.

The principal problem faced by the Florida radiation control officials is that the radiological program is currently both understaffed and underfunded. The program lacks sufficient monitoring stations and locations for the establishment of additional monitoring stations. The program also currently lacks sufficient legislative authority to conduct its environmental radiation surveillance program.

Florida Power and Light Company operates three nuclear power units in the state. Two units are located at Florida City and one at Fort Pierce. The latter reactor is located on Hutchinson Island, where the federal government has recently granted approval for construction of a second unit. Florida Power and Light is contructing two reactors in the southern Dade County area which are planned for operation in 1980. A reactor is also under construction at Crystal River and will become operational in 1977. Because of the high rate of construction of nuclear power plants in Florida, the state radiation control program will need to increase its surveillance and analysis activities in monitoring for leaking of radiation to the environment.

B. Workforce Profile

The Florida Radiological Health Program and the Office of Laboratory Services of HRS have a combined staff of 22 professional personnel, one technician and six clerical employees. Nineteen of the professional positions are filled by public health physicists, and three are filled by chemists.

The Radiological Health Program has three sections: a Technical Assistance Section, a Licensing Section and a Quality Control Section. The following table depicts the total staff of the Radiological Health Program not including the Office of Laboratory Services.

TABLE XIII

STATE OF FLORIDA

Department of Health and Rehabilitative Services Radiological Health Program Current (1976) Staffing Level

Position	1976
Public Health Physicist	6
Clerical	4
TOTAL	10

The Office of Laboratory Services has two main sections: Inspection and Compliance and Environmental Surveillance. The following table depicts the current staffing level of radiation control personnel employed by the Office.

TABLE XIV

STATE OF FLORIDA

Department of Health and Rehabilitative Services Office of Laboratory Services Current (1976) Staffing Level

Position	1976
Public Health Physicist	13
Chemist	3
Laboratory Technician	1
Clerical	2
TOTAL	19

Florida has 14,000 X-ray units and 889 active licenses for radioactive material users, as of 1976. There are an estimated 35 public health physicists employed by Florida's nuclear power plants, hospitals, and industry. Approximately 50 nuclear and medical X-ray technicians devote a portion of their time to environmental radiation surveillance activities which include source testing. Sources estimate that there is a total workforce of 95 persons in Florida engaged in radiation control functions.

C. Workforce Projections

The Florida Radiological Health Program has recently experienced a high average turnover rate. The program has lost five public health physicists in the last few years to private industry, the federal government, and the military. The relatively low salaries are the principal reason for such a high turnover rate, according to sources. Program officials estimate that there is a complete turnover of junior level professionals every five years.

State radiological officials have proposed to the Florida Legislature that a total of 27 additional positions be supported in the Fiscal Year 1977 budget. The request is based upon program needs, and the expectation that it requires at least one year for a new employee to be trained as a public health physicist and five years for such a person to be fully competent in the performance of duties. It is not expected that all of the positions will actually be acquired during the next fiscal year, chiefly because of state fiscal restraints. This request reflects a needs assessment for the next five years based on an analysis of the work that needs to be performed. Those positions not funded during the next fiscal year will be requested during subsequent legislative sessions.

The principal reason for such a growth need is the expectation that if the Safe Drinking Water Act becomes effective in 1977, as expected, the

Radiological Program will require a greater field capability to monitor radiological contaminants in water throughout the state, particularly in the phosphate area. Monitoring will be performed in the northern part of Florida to determine the presence or absence of radiological health hazards. In addition, the increasing number of nuclear reactors in the state will necessitate staff increases for environmental radiation surveillance.

The following table depicts workforce staffing level projections for the Radiological Health Program and the Office of Laboratory Services for the next five years; figures are based upon the assumption that projected staffing needs will be met by 1982.

TABLE XV

STATE OF FLORIDA

Department of Health and Rehabilitative Services
Radiological Health Program
Workforce Projections to 1982 (est.)

Position	1976	1977	1978	1979	1980	1981	%/annum turnover (average)	%/annum growth (average)
Physicist	19	23	27	31	35	39	20%	15%
Chemist	3	3	4	5	6	6	n/a	16%
Technician	1	1	1	1	1	1	n/a	0%
Other	6	5	6	7	8	9	n/a	9%
TOTAL	29	32	38	44	50	55		14%

Ten of the additional twenty-seven positions would be allocated to the Environmental Surveillance Program of the Office of Laboratory Services. These positions would be for water analytical activities and for improving environmental radiation surveillance around nuclear power reactors. Several of the "Other" positions would be used for electronic data processing as the Radiological Health Program hopes to improve its data retrieval capability.

The Laboratory is projected to receive two chemists for the performance of radium analyses (also included in Table III). One public health physicist will have the duty of interpreting laboratory results and will develop a standardized methodology for sample collection. Five public health physicists will be recruited to perform water analyses and three others will be required to monitor radiation levels in the ten-county, phosphate-rich area. An additional two public health physicists will be assigned to the Inspection and Compliance Program of the Laboratory to inspect facilities housing radioactive materials and X-ray machines. These persons will be stationed in Orlando and Jacksonville.

Additional growth, according to radiation control officials, is contingent upon further increases in Florida's population over the next five years. A 1970 census revealed that Florida had a population of about 7,800,000; it is estimated at nearly 9,000,000 at the present time. The University of Florida School of Business Administration recently forecast that the 1980 population may be over 9,500,000. Radiation officials consider it a reasonable supposition that the radiation control staff will grow at a rate similar to the population growth.

The radiological workforce in the private sector is also likely to increase for several reasons. The expansion of the nuclear industry in the state should cause an increased demand for those trained in radiation control and surveillance. Stepped-up surveillance, monitoring and enforcement activities by the state program may cause current users to increase radiation staffing levels in order to meet regulations. Finally, the usage of radioisotopes and the number of X-ray machines is increasing and facilities housing such radiation sources may find growing needs for experts in radiation control.

D. Training and Certification

Florida's radiological health program personnel receive training from various federal agencies such as the Environmental Protection Agency, the Food and Drug Administration Bureau of Radiological Health and the Nuclear Regulatory Commission. These federal agencies provide travel and per diem allowances to state radiological personnel. Most federally sponsored training courses are regarded as highly beneficial by state officials. These federal agencies supported the development of a radiological health course at the University of Florida which was held in December of 1976.

The Health Program Office sponsors formalized in-house training programs for staff professionals to upgrade skills. Most of the in-house training received by the Radiological Health Program staff, however, is carried out informally on-the-job.

E. Career Potential

Radiological health officials foresee a need developing for more research scientists in the radiation field. These persons are needed to identify sources of environmental radiation, and to determine the effects of other radiation sources that have not as yet been thoroughly researched.

The Radiological Health Program anticipates further major staffing increases in the next five years, and the program will continue to rely chiefly upon public health physicists. Within the private sector, demands are expected to increase for trained radiation control personnel such as health physicists, radiation physicists and radiation control technicians.

F. Conclusion

State officials have identified additional workforce needs; the radiological staff may double within five years. Additional monitoring capabilities are required by the program for surveillance of radiation levels in areas where phosphates are mined and in the vicinity of nuclear reactors. Laboratory capabilities require expansion for the state to adequately carry out enforcement responsibilities of the Safe Drinking Water Act. Finally, the increasing usage in the state of X-ray machines and radioisotopes may cause additional demands for personnel to monitor and license these sources. State radiological officials have requested funds for a significant personnel increase from the Florida Legislature for Fiscal Year 1977. Stringent budget controls may prevent the timely needed staff additions.

Increased needs are likely to occur in the private sector, in radiation control also, because of the expanding nuclear industry, the increasing usage of X-ray machines and radioisotopes, and state enforcement activities. In sum, it appears that career opportunities for radiation control personnel, such as health physicists, radiation physicists and radiation control technicians will continually increase in Florida during the next five years.

VI. SOLID WASTE

A. Introduction

The Florida Resource Recovery and Management Act, F.S. 403.701- 403.713, enacted in 1973, gives responsibility for regulating resource recovery and management activities in the State to the Department of Environmental Regulation (DER). The State resource recovery and management program shall, according to the Act: "provide guidelines for the orderly collection, transportation, storage, separation, processing, recovery, recycling, and disposal of solid waste throughout the State; encourage coordinated local activity within a common geographical area; and investigate the present status of solid waste management in the State with positive proposals for local action to correct deficiencies in present resource recovery and management processes."

Within two years after the adoption of the State program, all counties and municipalities are required to adopt, either solely or in cooperation with other counties and municipalities, local resource recovery and management programs to be approved by the Department. Nineteen areas that have been designated by the State, based upon the economic value of the energy contained in the solid waste generated by the major population areas of the State and the potential markets for that energy, must submit plans that include provisions for recycling or resource recovery.

The nineteen designated areas were chosen by the Resource Recovery Council, formed by the Act. This Council consists of thirteen members, nine of whom are chosen by the Governor. Among these nine are one representative from each of the following: municipalities, counties, environmental interests, the academic community, agricultural interests, business interests, resource recovery interests, professional engineering interests, and any other profession or occupation which may be affected by the provisions of the Act. Two members are appointed from the Senate by the President of the Senate, and two members are chosen from the House of Representatives by the Speaker of the House. The chief functions of the Council are to promote resource recovery throughout the State, and to recommend new legislation or amendments to existing legislation.

The Act prohibits the operation, maintenance, construction, expansion or modification of any resource recovery management facility or site without having obtained a permit from the Department. The Department is also authorized to assist counties and municipalities in complying with the Act by grants to pay a portion of the cost for planning and implementing the programs. The Department of General Services is charged with the responsibility of establishing a program for the collection and recycling of all wastepaper materials in all State offices.

At the present time, one resource recovery site is planned for operation in the State, in Dade County. Other areas have prepared feasibility studies and are in various planning stages for resource recovery operations. According to State sources, most sites will utilize pyrolysis.

No designated hazardous waste disposal sites are utilized in the State, although the Department of Environmental Regulation has contracted with Florida Resources and Environmental Analysis Center at Florida State University to survey hazardous waste sources, the quantities, and the disposal methods utilized throughout the State. Based upon the outcome of this survey sites and methods of disposal will be developed by the DER. Landfilling of hazardous wastes in the lower half of the State is not an environmentally sound method because of the high water table.

Although the State is actively implementing resource recovery and solid waste programs, additional efforts will be required due to the passage of the Federal Resource Conservation and Recovery Act. Until the Act's regulations are promulgated, specific effects of the Act upon the State's program will not be apparent, although it is anticipated that changes in State legislation may be required.

B. Workforce Profile

Chief responsibilities for the State's resource recovery and management program are assigned to the Solid Waste Section, Bureau of Drinking Water and Special Environmental Programs, of the DER. Also in the DER are staff members of the Resource Recovery Council. Among the activities of the Solid Waste Section are the following:

1) Inspecting solid waste facilities to confirm their compliance with regulations;

2) Notifying facilities not in compliance, providing assistance, and initiating legal proceedings as required;

3) Reviewing applications for proposed new sites for coordination with adjacent counties, equipment requirements, drainage, and legal and technical considerations;

4) Developing special plans for the disposal of pesticides, poisons, and other hazardous materials for the protection of the environment;

5) Acting as liaison with EPA and other Federal and State agencies in solid waste matters;

6) Disseminating information concerning solid waste to interested organizations and individuals.

In the Solid Waste Section are five individuals: one administrator, two engineers, one environmental specialist and one secretary. Field and support services are provided by the Division of Environmental Permitting, chiefly through its district offices. In person-years, devoted to solid waste in this Division are the following: 2 administrators, .06 administrative assistant, 4.2 engineers, 4.91 chemists, 2.15 environmental specialists, 1.2 environmental technicians, .25 pollution control specialist and 1.75 clerical positions.

Legal support is provided by DER's Office of General Counsel, which contributes the equivalent of one-half attorney and one-half secretary, according to DER records. In addition, staff persons of the Resource Recovery Council include one executive director, one engineer, one environmental specialist and one secretary.

Chemical engineers are preferred for engineering positions, and approximately one-third are registered professional engineers. Environmental specialists must have at least bachelor-level degrees in chemistry. Environmental technicians generally are high school graduates and have been trained on the job. All hiring of new personnel is carried out through the State Merit System. Sources indicate that qualified persons are not difficult to locate at the present time.

Information concerning staffing levels was obtained through interviews with sources in the field, and from information contained in the DER document dated August 1, 1976, entitled, "Department of Environmental Regulation Manpower Allocation". The following depicts the above staffing information in tabular form, and all workforce numbers are depicted in person-years. The actual number of persons in each Division engaged in solid waste activities may be higher than the numbers suggest.

TABLE XVI

FLORIDA DEPARTMENT OF ENVIRONMENTAL REGULATION

Solid Waste Management
Current (1976) Staffing Level

Dept./Position*	1976
Office of the Secretary (Office of General Counsel)	
Attorney	.50
Other	.50
Division of Environmental Permitting	
Engineer	4.70
Scientist	7.36
Technician	1.20
Other	1.06

TABLE XVI (cont'd)

Division of Environmental Programs	
Engineer	2.00
Scientist	1.00
Other	2.30
Division of Resource Recovery Council	
Engineer	1.00
Scientist	1.00
Other	2.00
TOTAL	24.62

* "Other" includes administrative and clerical

Within Florida, 13 local pollution control programs carry out planning and implementation of solid waste control activities. According to input from State and local sources, those involved in solid waste are principally degreed and non-degreed inspectors and bachelor and master-level engineers. The following table depicts local pollution control programs engaged in solid waste activities and person-years of effort currently expended toward the field (information extracted from "Local Pollution Control Programs Budget Summary - FY 1975-76"):

TABLE XVII

STATE OF FLORIDA

Local Pollution Control Programs
Solid Waste Management
Current (1976) Staffing Level

Program	1976
Alachua County Pollution Control District	.50
Brevard County Environmental Health Department	.39
Broward County Pollution Control Department	2.95
Duval County Pollution Control Department	2.00
Hillsborough County Environmental Protection Commission	.80
Manatee County Pollution Control Department	3.50
Orange County Polluton Control Department	1.00
Palm Beach County Division of Environmental Sciences & Engineering	2.00
Reedy Creek Pollution Control Department	.25
Sarasota County Environmental Control Board	.90
St. Petersburg Environmental Affairs	.70
Seminole County Department of Environmental Services	.48
Volusia County Environmental Control Office	.60
TOTAL	16.07

There are currently 355 sanitary landfills in the State, approximately 88% public and 12% private. These landfills vary greatly in size, and staff sizes vary from one to approximately 30. State sources have estimated that there are currently 800 to 1,000 landfill operators in the State.

C. Workforce Projections

During 1976, the DER prepared legislative budget requests for Fiscal Year 77-78. For solid waste activities, the following personnel requests were made:

1) One environmental specialist to develop controls for the proper disposal of hazardous wastes;

2) Six environmental specialists (one for each district and subdistrict) to assist in the permitting of resource recovery and management facilities. As of July 1, 1976, approximately 14% of the operating sites were permitted;

3) Two professional engineers; two environmental specialists and a clerk typist for the central office, to review, comment on and approve each of the local resource recovery and management programs to be submitted by counties and municipalities by July 1, 1978.

Extra funds were also requested due to EPA's recently-stated position that it will not provide funds for basic program requirements. As federal funds may only be used for new activities in program areas not covered by the basic program, the basic program must be funded from General Revenue or be cut back.

According to State solid waste program sources, the chances for receiving the required funding are narrow, as the Governor has not recommended any new appropriations for the program. In view of the recent passage of the Federal Resource Conservation and Recovery Act, sources believe that a greater number of positions than had been requested will be required to carry out current and future mandated responsibilities. Specific needs are particularly difficult to determine, as regulations for the new Act have not yet been released. This factor, coupled with the uncertain future of strict State budgetary controls, has caused State officials to delay workforce forecasts until needs and/or future budgets become increasingly apparent.

Workforce growth needs are also expected to occur at the local level, in part due to the impending requirements for developing resource recovery and management programs. Input from local sources suggests that the amount of effort spent by local programs for solid waste may at least double during the next several years in the planning stages. Subsequent growth rates will be contingent upon the types of plans that are proposed, and upon the impact of the new federal act at the local level. Indications are that workforces will continue to increase, again being contingent upon the availability of funds.

Among the requirements to be met for a sanitary landfill to be permitted is that sites must have full-time operators in attendance during operating hours. Sites serving less than 5,000 people may take exception, when approved by the Department. As enforcement of the Act proceeds, State sources project that the number of landfill operators will necessarily increase, possibly to 1,500. If resource recovery programs become implemented on a wide scale, this growth rate at the operations level may be higher, causing needs for operators with higher skills, for trained technicians, and for highly skilled engineers. For the disposal of hazardous wastes, requirements will probably occur for trained technicians, for scientists, and for engineers. Again, the total workforce impact will become increasingly apparent as State and local plans are finalized, and as federal regulations are released.

D. Training and Certification

Informal on-the-job training is offered to new entrants in the Solid Waste Section, whereby these persons are briefed by supervisors regarding specific duties and procedures. New entrants are then assigned specific tasks, and the performances are critiqued. The length of this process varies, depending upon the employees' progress rates.

Funds are not available for personnel to pursue college degrees at State expense. However, the Solid Waste Section staff and district personnel are occasionally able to attend national meetings and courses sponsored by professional associations and by EPA. State professional meetings are also attended. DER district personnel attend training sessions sponsored by the Solid Waste Section. These sessions last one day and are usually held twice each year. All district personnel that are involved in solid waste attend these sessions, as do officials from Florida's local pollution control programs. An average of eight local officials attend each session.

The Solid Waste Section cooperates with the Center for Training, Research and Education for Environmental Occupations (TREEO) of the University of Florida's Division of Continuing Education, in conducting statewide workshops on solid waste management. These seminars are held in five areas of the State, and focus on hazardous waste control, resource recovery, and leachate control from sanitary landfills. Fifty to 75 local and area officials, operations personnel and engineers, attend the two-day functions. Before the formation of the TREEO Center, which was quite recent, the Solid Waste Section had been offering this type of training without outside input or assistance.

Beyond that which is offered by the Solid Waste Section and the TREEO Center, few training or educational opportunities are available in the State in the field of solid waste management, at the vocational, undergraduate or aduate level.

E. Career Potential

In the State and local pollution control agencies, increasing needs are expected to occur for highly trained engineers and scientists, and to a smaller extent, for trained technicians. The number of landfill operators is expected to increase, and opportunities may occur for operator- and technician-level personnel who have been trained in resource recovery methods and hazardous waste disposal. The expansion of these fields is also expected to cause increased needs for scientists and engineers to implement hazardous waste disposal and resource recovery plans and administer operations.

F. Conclusion

The Department of Environmental Regulation is responsible for implementing the Florida Resource Recovery and Management Act. Permitting of solid waste management facilities is being carried out, and plans for implementation of solid waste management, resource recovery, and hazardous waste disposal plans are currently being developed. The State's program needs additional funds and personnel to implement the State Act, and expects increased workforce requirements to occur as a result of the Federal Resource Conservation and Recovery Act. State budgetary controls are preventing the program from staffing to its required level.

Increased workforce needs in local pollution control programs are expected to occur as a result of the State law's provisions for developing and implementing resource recovery and management plans. Also as a result of enforcement of the existing law, and the implementation of plans, opportunities are expected to increase for landfill operators, and for technicians, scientists and engineers with expertise in the fields of resource recovery and hazardous waste disposal.

Solid waste management seminars are offered by DER, in cooperation with the University of Florida in the field of solid waste. However, other educational opportunities in the field are not readily available at any level, as federally subsidized programs have ceased. Sources in the field predict that the future workforce demands will not be met, as educational institutions are not producing persons with significant amounts of expertise in the field.

VII. WASTEWATER

A. Introduction

Chief authority for Florida's wastewater program is derived from Chapter 403, Florida Statutes. Implementation of the Act is assigned to the Florida Department of Environmental Regulation. The Act States:

> It is declared to be the public policy of this State to conserve the waters of the state and to protect, maintain and improve the quality thereof for public water supplies, for the propagation of wildlife, fish and other aquatic life, and for domestic, agricultural, industrial, recreational and other beneficial uses, and to provide that no wastes be discharged into any waters of the state without first being given the degree of treatment necessary to protect the beneficial uses of such water.

Among the powers delegated by the Act to the Department are the following: to approve and promulgate current and long-range plans developed for water quality control and pollution abatement, to accept loans and grants, to adopt, modify and repeal rules and regulations, to hold hearings, to classify waters of the State and establish ambient water quality standards, and to establish a permit system for the operation, construction, or expansion of any installation that may be a source of water pollution.

The Act authorizes counties and municipalities to establish and administer local pollution control programs that comply with the Act. The DER maintains approval authority for local programs. At the present time there are fifteen local pollution control programs that carry out functions in the area of water quality.

Rules of the DER, Chapter 17-16, "Water and Domestic Wastewater Plants Operator Certification", classified wastewater treatment plants into four levels, A,B,C, and D according to the complexity of treatment and volume of wastes. Lead operators are required to be certified at the level of the plant operated.

Under P.L. 92-500, the Federal Water Pollution Control Act, Florida has been delegated NPDES permitting authority. In addition, the State has review authority over plans and specifications for facility construction projects, has authority over operation and maintenance manual preparation, and has review authority over change orders.

The water quality program in DER is conducting basic bio-research on the impact of urbanization on ambient waters. Personnel are also working toward the development of methods and techniques for the assessment and establishment of water quality standards that, once developed, will become law for each water quality basin.

B. Workforce Profile

Approximately 43% of the DER's activities are focused in the water quality program. Input is provided from all Divisions of the DER: the Division of Administrative Services, the Division of Environmental Programs (Bureau of Water Quality Management and Bureau of Wastewater Management and Grants), the Division of Environmental Permitting (Field operations, Offices of NPDES, Certification and Manpower Development, Enforcement and Bureau of Permitting) and the office of General Counsel. The functions and activities of the overall water quality program include:*

1) Permitting: evaluate applications and issue permits for the construction, modification and operation of municipal, industrial and private wastewater treatment facilities and other pollution sources;

2) Grants Loan Administration: carry out plan review, technical support and fiscal accounting;

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* Functions extracted from "State of Florida Department of Environmental Regulation Program Briefing Outline:, prepared by Office of Program and Data Analysis, May 18, 1976.

3) Enforcement: investigate fish kills and pollutant spills; carry out routine inspections, water quality sampling, friendly notice, technical assistance, legal notice and order, and litigation in a court of competant jurisdiction, if required,

4) Monitoring: Perform systematic sampling of all significant waters of the State, analyze and evaluate samples and store data.

5) Training: Test and certify all qualified wastewater treatment plant operators in the State and maintain computerized records of their certification status, training and experience;

6) Standard Setting: Classify waters by quality criteria:

7) Special Studies: Review EPA permits issued for offshore dumping and incineration, oil spills, fish kills and others;

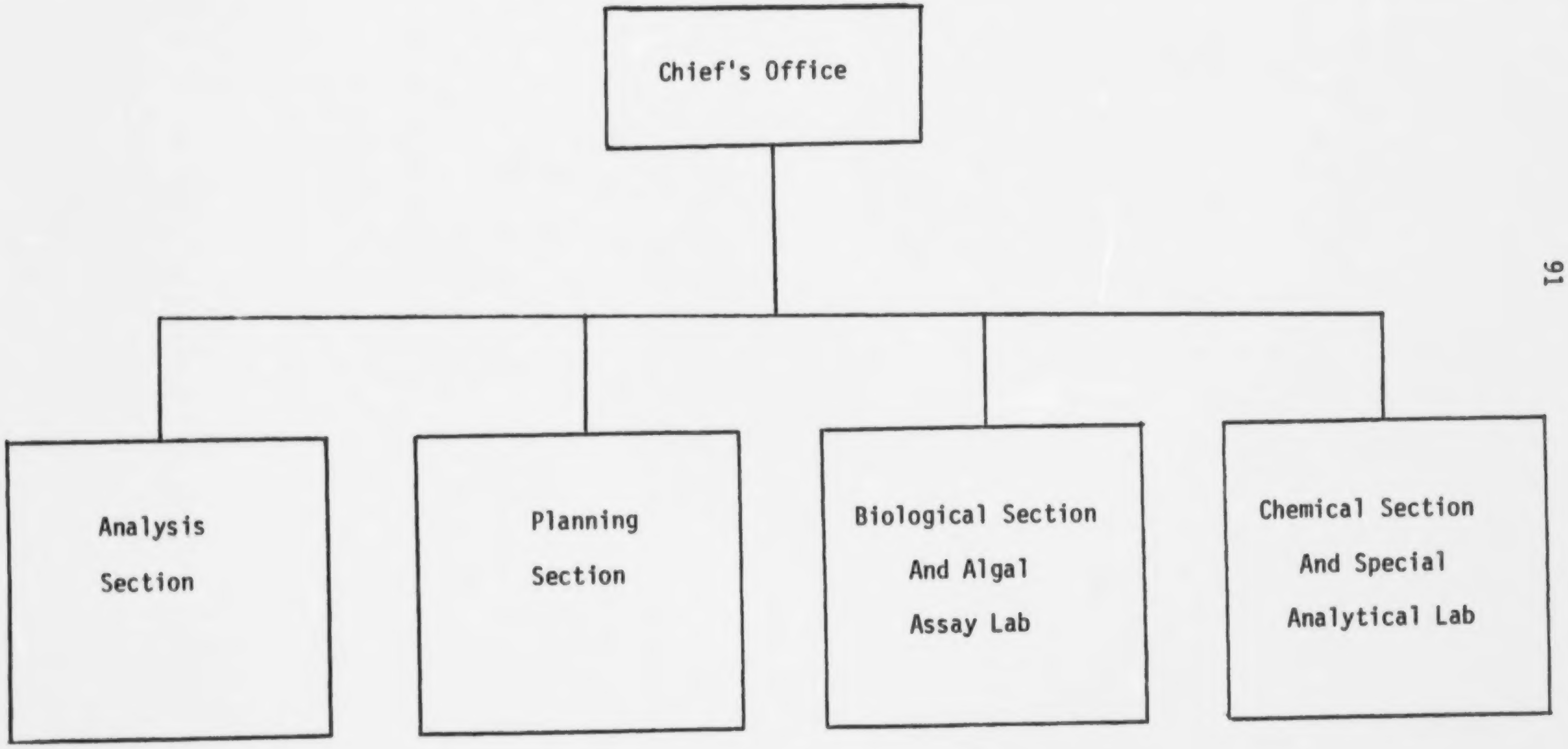
8) Planning: Perform planning required by P.L. 92-500 including State Section 106 work planning, Section 208 areawide planning for non-designated areas, Section 201 facilities planning, Section 303(e) basin planning and Section 209 water resources basin planning.

The department also issues permits for dredge and fill operations, evaluating water quality, the biological impacts and the hydrographics of proposed boat and ship docks, sea walls, canals and adjacent landfill projects prior to issuance or denial of permits. Workforce levels for this activity will not be covered in this report, as it does not fall under the mandates of P.L. 92-500.

In the Bureau of Water Quality Analysis there are 40.4 person-years for water quality: 4.4 administrators, one engineer, 16 environmental specialists, three engineering technicians, one pollution control specialist, one statistician, three biologists, one microbiologist, four chemists and six clerical employees. In the Bureau of Wastewater Management and Grants are 23 positions: three administrators, nine engineers, six environmental specialists and five clerical employees.

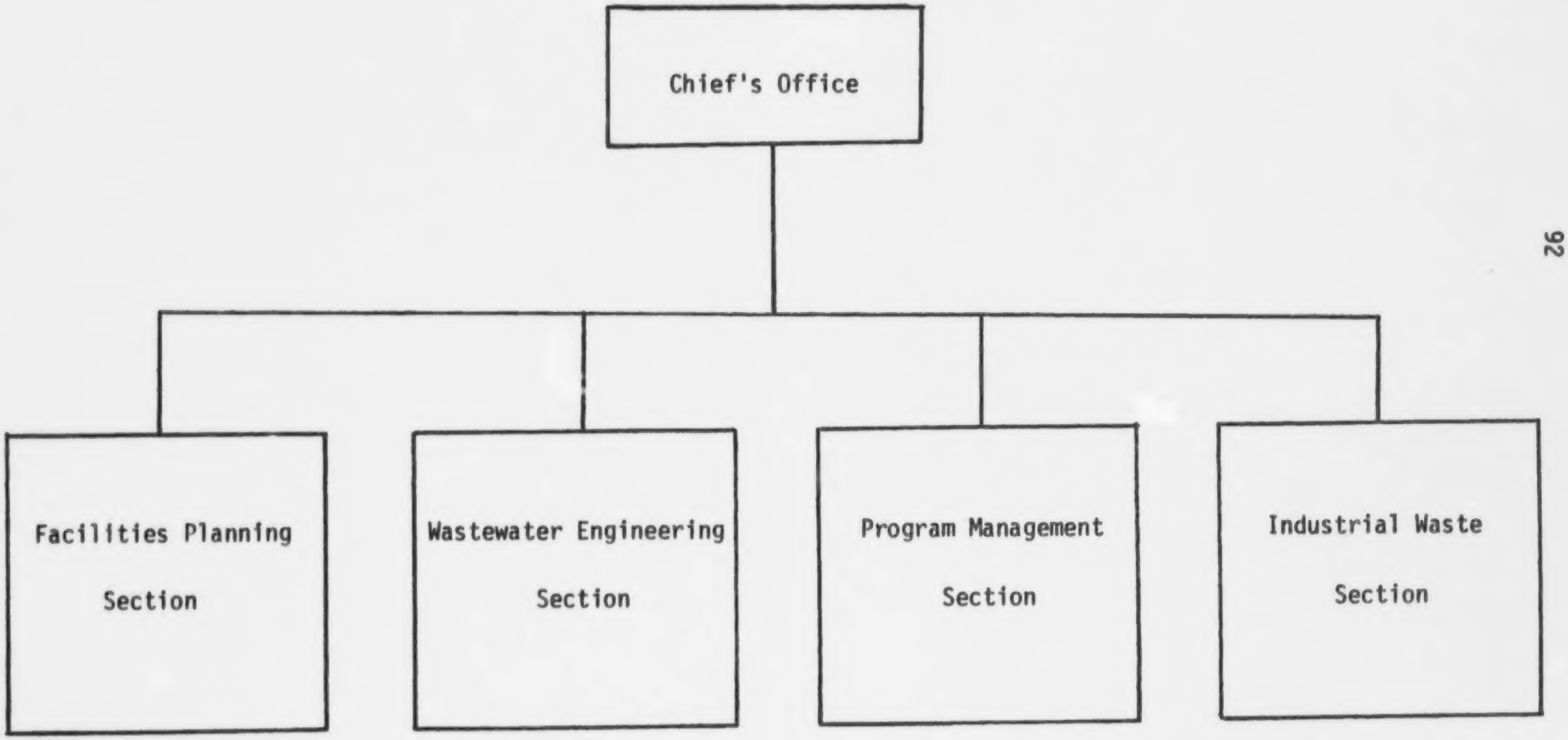
FLORIDA DEPARTMENT OF ENVIRONMENTAL REGULATION
Division of Environmental Programs
Bureau of Water Quality Management

Figure 5


Chief's Office
Analysis Section
Planning Section
Biological Section And Algal Assay Lab
Chemical Section And Special Analytical Lab

FLORIDA DEPARTMENT OF ENVIRONMENTAL REGULATION
Division of Environmental Programs
Bureau of Wastewater Management & Grants

Figure 6


Chief's Office
Facilities Planning Section
Wastewater Engineering Section
Program Management Section
Industrial Waste Section

In the Division of Environmental Permitting, in both the Tallahassee office and the district offices, 158.91 person-years of effort are given to water quality, consisting chiefly of engineers, environmental specialists, environmental and engineering technicians, biologists and chemists. The Division of Administrative Services offers 4.5 person-years for accounting and data coordination, while the office of General Counsel contributes legal and clerical support of 5.95 person-years.

Preferred for engineering positions are sanitary engineers, but as these persons are in short supply, other types, such as aerospace, mechanical, electrical or chemical engineers are hired and trained in the field. About one-half of the engineers are registered professional engineers. Environmental specialists must have at least bachelor level degrees with backgrounds in science. Technicians are mainly high school graduates that have been trained on the job. Some have had vocational school backgrounds or some college work.

Information concerning staffing levels was obtained through interviews with sources in the field, and from information contained in the DER document dated August 1, 1976, entitled, "Department of Environmental Regulation Manpower Allocation". The following depicts the above staffing information in tabular form, and all workforce numbers are depicted in person-years. The actual number of persons in each Division engaged in wastewater activities. may be higher than the numbers suggest.

TABLE XVIII
FLORIDA DEPARTMENT OF ENVIRONMENTAL REGULATION
Wastewater Program Operations
Current (1976) Staffing Level

Department/Position	1976
Office of General Counsel	
Attorney	4.20
Other	1.75

TABLE XVIII (cont'd)

Division of Administrative Services	
Accountant	2.00
Technician	1.00
Other	1.50
Division of Environmental Permitting	
Engineer	42.82
Scientist	58.30
Technician	25.10
Other	32.69
Division of Environmental Programs	
Engineer	10.00
Scientist	31.00
Technician	3.00
Other	20.10
TOTAL	233.46

* "Other" includes administrative, clerical, training, data management.

Within Florida, 15 local pollution control programs carry out regulatory services in the field of water pollution and water quality control. According to input from state and local sources, those involved in wastewater are principally engineers, along with scientists (biologists and chemists) and technicians. The following table depicts local pollution control programs engaged in wastewater activities and person-years of effort currently expended toward the field (information extracted from "Local Pollution Control Programs Budget Summary FY 1975-76").

TABLE XIX
STATE OF FLORIDA
Local Pollution Control Programs
Wastewater Management
Current (1976) Staffing Level

Program	1976
Alachua County Pollution Control District	2.50
Brevard County Environmental Health Department	3.75
Broward County Pollution Control Department	27.20
Dade County Pollution Control Department	71.00
Duval County Pollution Control Department	16.00
Hillsborough County Environmental Protection Commission	17.20
Lake County Pollution Control Department	7.00

TABLE XIX (cont'd)

Manatee County Pollution Control Department	3.50
Orange County Pollution Control Department	23.00
Palm Beach County Division of Environmental Sciences and Engineering	28.00
Reedy Creek Pollution Control Department	7.00
St. Petersburg Environmental Affairs	6.00
Sarasota County Environmental Control Board	6.73
Seminole County Department of Environmental Sciences	2.56
Volusia County Environmental Control Office	3.00
TOTAL	224.44

As of August, 1976, there were twelve designated Section 208 areawide planning agencies. Staffs for these efforts tend to be quite small, and most work is conducted by contracting with outside agencies and consulting firms.

There are currently 3,650 wastewater treatment plants in the state that are permitted by DER, as follows (Class A is the highest level):

Classification	No. of Plants
A	40
B	185
C	1,525
D	1,900
TOTAL	3,650

According to the DER Rules, Chapter 17-16, an operator is any person including the owner, in actual charge of the operation, supervision, or maintenance of a water or wastewater treatment plant. The Rules specify the certification levels for lead operators required for each level of plant, and the minimum on-site time required for certified operators. All lead operators must hold a certificate, with the exception of "operator trainees", who receive technical instruction in operation, supervision, and maintenance under the direct supervision of a certified operator not exceeding two years.

The following table depicts the current number of wastewater treatment plant operators, by category.

TABLE XX

STATE OF FLORIDA

Current (1976) Certified
Wastewater Treatment Plant Operators

Classification	1976
A	362
B	424
C	1,920
D	N/A
TOTAL	2,706

Private consulting firms offer services in the design, construction and operation of wastewater treatment plants. State sources estimate that there are 30 to 40 such firms in the State. Larger industries employ their own engineers for design and assurance of ongoing operation. Often they retain attorneys in Tallahassee to keep abreast of relevant environmental issues and and to represent the companies as necessary. There are six major types of industries in Florida, all of which require water pollution controls. These industrial concerns are power, phosphates, citrus, pulp and paper, sugar and food production.

C. Workforce Projections

During 1976, the DER prepared a legislative budget request for Fiscal Year 1977-78. For water quality control, the following requests were made:

1) Determination of and compliance with industrial waste treatment standards: an engineer, an engineering technician and a secretary for Tallahassee to complement the existing waste section staff of two engineers. This section is responsible for assuring that industrial waste is treated at secondary level or that such other treatment is performed as is deemed necessary and ordered by DER.

2) Permitting and enforcement function increases in districts:
    a) one engineer for Northwest District, Tallahassee Branch office to assist with permitting, enforcement, compliance monitoring, plant O&M inspections, complaint investigation and administrative duties;

b) one biologist for St. Johns River Subdistrict, to conduct field investigations of violations and to organize and write detailed case reports used by attorneys in preparation for litigation;

c) two secretaries, one clerk typist, and three field inspectors for district and subdistrict offices to assist in the processing of permit applications.

Whether or not these positions will be granted is not yet known by DER staff. Sources do indicate that the Florida legislature is unlikely to approve additional staffing increases for the water quality program in the foreseeable future, and that the water quality staffing level in DER is likely to remain stable during the next five years. Additional personnel will be required for Section 208 planning, but these personnel will probably of necessity be diverted from the Section 106 planning program.

If staffing increases do occur in the future, it will be as a result of increased incentives and financial support form the federal government. As neither appear forthcoming, DER water quality staffing levels will probably remain stable.

Input from sources in State and local programs, as well as the Florida Local Environmental Regulatory Association indicates that growth of water quality staffing levels in local pollution control programs may occur, principally for two reasons: a) three new programs may be formed in the near future, and possibly more within the next five years, and b) increasing activity in Section 208 planning. Estimates have been made that the overall staffing increase will be 10% annually.

The following table depicts projected workforce levels to 1982 for local water quality programs. Current figures have been rounded to the nearest whole number, and professional breakdowns for both current and future levels are estimates.

TABLE XXI
STATE OF FLORIDA
Wastewater Pollution Control Programs Workforce Projections to 1982 (est.)

Position	1976	1977	1978	1979	1980	1981	%/annum turnover (average)	%/annum growth (average)
Engineer	90	98	108	119	132	144		10%
Scientist	67	74	81	89	98	109		10%
Technician	33	37	41	45	49	54		10%
Other	34	37	41	45	49	54		10%
TOTAL	224	246	271	298	328	361	N/A*	10%

*No attempts were made to estimate the average annual turnover rate, as research has shown that rates vary greatly among local programs.

State sources predict an increase in the number of certified operators during the next five years, because of increased enforcement of certification laws and the increasing complexity and number of plants. Very small systems will probably tend to hire consulting firms for overseeing operators, although these persons will also be required to be certified. The number of operators at level "C" is projected to increase most rapidly, at 8 to 10% annually, while all other levels are expected to increase at approximately 5% annually.

Early in 1977 (March), the number of wastewater treatment plant operators was tallied, and it was found that the number of operators in Classes A and B had declined from the level of October 1976. DER officials have not determined the cause for this phenomenon, but future workforce projections remain unchanged.

Based upon the above, the following table depicts workforce projections to 1982 for certified wastewater treatment plant operators in Florida.

TABLE XXII

STATE OF FLORIDA

Certified Wastewater Treatment Plant Operators
Workforce Projections to 1982 (est.)

Classification	1976	1977	1978	1979	1980	1981	%/annum turnover (average)	%/annum* growth (average)
A	362	305	320	336	353	371		5%
B	424	300	315	331	348	366		5%
C	1,920	1,985	2,164	2,359	2,571	2,802		9%
D	N/A	71	75	79	83	87		5%
TOTAL	2,706	2,661	2,874	3,105	3,355	3,626	25%	8%

*%/annum growth (average) is calculated beginning with 1977 due to unexplained decline from 1976 figures.

While state sources have estimated the annual operator turnover rate to be 25%, many of those included in this figure do not actually leave the profession. Rather, operators are exhibiting a high rate of mobility among plants, as mandatory certification has afforded a greater number of career opportunities for certified operators.

DER wastewater officials believe that workforce growth for industrial engineers and consulting firms in the private sector will be contingent upon the commitment to water pollution at the federal level and at the state level. If governmental programs, policies and support remain unchanged, workforce levels in the private sector will probably not demonstrate significant growth.

D. Training and Certification

Most new entrants into DER water quality programs receive informal on-the-job training from supervisors. There is no internal formalized upgrade training for personnel, although higher level professional employees occasionally attend related technical conferences. DER has also recently received two EPA grants that were utilized to train DER personnel, as follows:

1) 75 DER personnel were trained in "Field Sampling and Analysis";

2) 18 DER operation and maintenance inspectors were trained in the proper techniques of performing O & M inspections.

Also through EPA grants, DER coordinated training programs for wastewater personnel throughout the state. This training was as follows:

1) 110 wastewater laboratory personnel were trained in proper and standardized methods of effluent sampling and analysis;

2) 150 wastewater operator instructors were trained.

The DER does not have the authority to conduct training for wastewater treatment plant personnel. The Certification and Manpower Development component of the Division of Environmental Permitting is responsible for the certification of water and wastewater treatment plant operators and well drillers. DER presently has no authority to regulate operators of wastewater collection systems, but plans to request such authority from the State Legislature. In administering the certification process, DER sets guidelines and operator qualifications as allowed by legislation, and prepares and administers certification examinations. Development staff have established guidelines and approved courses for water and wastewater treatment plant operators. This activity is carried out as a result of a recent rule requiring that operators in Grades A, B and C complete an approved course prior to being certified. Established guidelines for training programs relate to the following: instructors, curricula, instructional equipment, trainee evaluations, records, class sizes, credits toward certification requirements, and follow-up reports.

Minimum curriculum requirements for wastewater treatment operator training courses have been established for approval by DER. Nine major categories have been outlined that must be included in each program, and specific required contents for each category have been defined. The nine major categories are as follows, with classroom hours required per certification level.

TABLE XXIII

STATE OF FLORIDA

Wastewater Treatment Plant Operator Training Curriculum*

Category	Classroom Hours Required Per Certification Level A	B	C
Mathematics	3	8	11
Laboratory & Science	13	20	17
Operation	26	36	42
Personal Development	13	8	9
Health & Safety	6	4	4
Maintenance	4	5	9
Clerical & Record Keeping	15	12	10
Supervision & Management	33	22	13
Rules, Regulations, Permits & Quality Standards	7	5	5
TOTAL	120	120	120

*Minimum Curriculum Content for Wastewater Treatment Plant Operators Training Courses Approved by the Florida Department of Environmental Regulations.

By the end of 1976, four programs offered by vocational schools and community colleges were approved by the DER for wastewater operator training. Three offered training for Grade C operators, and one offered courses for operators of Grades A, B and C. By April of 1977, eleven programs had been approved. DER personnel anticipate that within several years, 20 to 25 programs at community colleges and vocational schools will be approved by the DER.

In addition to the completion of approved courses for certification in Grades A, B and C, operators of these grade levels are required to accumulate three (C), eight (B) or twelve (A) years of actual consturctive experience, which must include specified amounts of actual experience in the operation, supervision and maintenance of wastewater treatment plants. Credited toward constructive experience is the participation in related training opportunities. The number of years of constructive experience credited to operators for completion of specific training opportunities is defined in state rules and regulations.

The Florida Water and Pollution Control Operators Association sponsors one annual short school and eleven regional short schools each year which are recognized as one-half and one-third year's constructive experience, respectively. The annual school is held at the University of Florida and lasts one week. The regional schools are held at local college campuses, and last approximately three weeks. Classes are held several days each week, with a minimum of 12 classroom hours held over the three-week period. Approximately 10 operators annually participate in regional schools, while an average of approximately 400 operators attend each annual school.

The Center for Training, Research and Education for Environmental Occupations (TREEO) of the University of Florida's Department of Continuing Education has recently been formed to provide training to persons in environmental fields. The initial thrust will be in the area of wastewater, and seminars have already been held for personnel in the field. Future plans include the development of short courses, seminars and formalized vocational courses for Class A, B and C operators, the development of instructor training courses and the administration and coordination of problem-solving research in environmental fields. DER's Certification and Manpower Development Unit is currently cooperating with TREEO to develop standardized training materials for the training of water and wastewater plant operators.

DER officials indicate that when the projected 20 to 25 vocational curricula are approved and the TREEO center is fully functional, educational and training opportunities will be adequate to meet the State's needs for treatment plant personnel. Moreover, a continuing improvement should occur, as the DER will continually upgrade and refine its guidelines and requirements.

E. Career Potential

State officials currently foresee no new or unique careers emerging in the field of water quality or water pollution control. If federal impetus increases, additional demands for personnel could be created that at present cannot be predicted. Little or no workforce growth is predicted under present circumstances in the DER, chiefly because of stringent State budget policies.

Increased opportunities may occur for engineers, scientists and technicians in local pollution control programs. Opportunities should also increase for entry level wastewater plant operators, who should find promising career opportunities available through the upgrade process.

F. Conclusion

Florida has assumed the majority of delegable responsibilities for carrying out the mandates of the Federal Water Pollution Control Act, P.L. 92-500. Officials do not foresee appreciable workforce increases at the State level, Chiefly due to State budget limitations. Local agencies may increase wastewater staffing levels, principally to expand upon Section 208 planning activities, the increase projected at approximately 10% annually during the next five years. At the present time Florida seems to be experiencing a shortage of sanitary engineers.

State laws require that operators of wastewater treatment plants be certified, and regulations define training and experience requirements for certification eligibility. The Department of Environmental Regulation administers the certification program and approves courses and programs for operators. While a substantial increase is projected in the number of operators, State sources predict that available training opportunities will be adequate to meet needs within several years.

VIII. ENERGY

A. Introduction

The State of Florida has two main energy agencies. The State Energy Office assumes the primary role. The Governor's Petroleum Allocation and Energy Conservation Council was created by Florida Statute 20.31 to advise and assist the State Allocation official in implementing the mandatory energy allocation program, and to minimize the adverse effects of fuel shortages. The State Energy Director is the Chairperson of the Council, which is composed of 35 members. The State Energy Office was established by the Act of the 1975 Florida Legislature to be responsible for the planning, development, coordination and implementation of the state energy program. The office has primary responsibility for energy conservation, contingency planning, allocation, data collection, analysis, public information and education, and monitors energy research and development that is of interest to the state. The office also provides forecasts of energy conditions, assess shortages, and recommends energy legislation. The Secretary of Administration is provided with authority to adopt and promulgate such rules and regulations as are necessary to carry out the provisions of state energy programs.

B. Workforce Profile

The State Energy Office is directed by Carlos S. Warren, Ph.D. Fifteen staff positions have been authorized for the Energy Office, although 18 persons were recently on staff. The office is composed of the occupational categories as depicted in the following table.

TABLE XXIV

FLORIDA STATE ENERGY OFFICE

Current (1976) Staffing Level

Position	1976
Director	1
Energy Management Administrator	1
Energy Data & Policy Analysis Administrator	1
Research Assistant	2
Energy Analyst	6
Petroleum Allocation Specialist	1
Statistician	1
Computer Systems Analyst	1
Staff Assistant	1
Secretary	3
TOTAL	18

Emergency allocation planning was the primary function of the office from 1974 until recently, and as many as 40 persons were involved in this effort. Primary emphasis in the office has now shifted to conservation planning and other energy matters. The job categories shown in the table reflect the emerging planning and data collection role of the office.

The Florida State Energy Office closely follows federal program impetus. The state has had energy programs in existence since 1972-1973, which is prior to the creation of many energy offices in other states. Program officials consider federally-mandated programs to be the only way to obtain new services in the field of energy, as state legislators are usually unwilling to financially support state energy offices independently. These officials maintain that the only way state funding will be obtained for an energy program is if the activity has a direct impact on the lives of the citizens.

Florida has approximately 25 agencies involved in the field of energy in some manner which include:

1) Division of Community Services (weatherization of homes);
2) Department of Health and Rehabilitative Services (studies energy costs for the poor and aging);
3) State Solar Center of the State Board of Regents (conducts solar energy research);
4) Resource Recovery Council (involved in developing waste recovery systems);
5) Department of General Services (minimizes energy costs in the design and construction of buildings).

C. Workforce Projections

The present staffing level of 15 persons in the State Energy Office represents a decrease from the 1975 level of 18. In 1974, because of the involvement with the emergency allocation program, the State Energy Office had a total staff of 40. This attrition and turnover rate is not typical but is simply the result of changing office functions. Projected staff growth for the next five years is shown in the following table.

TABLE XXV

FLORIDA STATE ENERGY OFFICE

Workforce Projections to 1982 (est.)

Position	1976	1977	1978	1979	1980	1981	%/annum turnover (average)	%/annum growth (average)
Administrator	3	3	4	4	4	5	n/a	12%
Energy Analyst	6	6	10	11	11	12	n/a	17%
Energy Spec.	4	7	9	9	10	11	n/a	25%
Other	2	3	3	4	6	7	n/a	30%
Clerical	3	3	4	4	4	5	n/a	12%
TOTAL	18	22	30	32	35	40		18%

The Florida State Energy Office has received planning grants from PL 94-190, the Energy Policy and Conservation Act, for the hiring of seven additional personnel for the state's energy conservation program. The additional personnel will increase the office staff to 22 during Fiscal Year 1977. The State Energy Office is requesting eight more persons from the Florida Legislature for state activities to bring the staff level to 30 by Fiscal Year 1978. There is a possibility that five to six more persons will be added to the office staff from additional federal funds which would be an increase to 35 persons within two years. Further, if the legislature accepts various other proposals that the Energy Office director is submitting, the staff may increase to 40 or 50 by 1982. The director stated that much uncertainty exists regarding whether or not the legislature will provide the funding necessary for such staff increases.

D. Training and Certification

Florida Energy Office officials were unable to supply any information concerning formal training in the field of energy. Informal on-the-job training is provided for office staff for specific job roles.

E. Career Potential

Energy officials are confident that the career potential in the field of energy will markedly improve over the next five years. Barring another embargo, there is likely to be a dramatic growth in the number of jobs that are related to energy activities. These officials foresee a great growth potential in the field of solar energy in Florida as the industries conducting research become more innovative. In addition, some public sector growth for planners and energy specialists appears to be developing.

F. Conclusion

Staff growth potential for the Florida State Energy Office is not unlike that for other state energy programs in that the programs are dependent upon federal program initiatives. The state is heavily involved with the State Energy Conservation Program as a result of federal impetus. Some possibility exists that the staff of the Energy Office will more than double during the next five years.

U.S. ENVIRONMENTAL PROTECTION AGENCY
Office of Research and Development
Environmental Research Laboratory
Gulf Breeze, Florida

U.S. ENVIRONMENTAL PROTECTION AGENCY
Office of Research and Development
Environmental Research Laboratory
Gulf Breeze, Florida

A. Introduction

The EPA Gulf Breeze Environmental Research Laboratory is one of seven such research laboratories operating with the Office of Health and Ecological Effects, EPA Office of Research and Development. Under a recent reorganization within the Office at Research and Development (ORD), the laboratory branch structure was redefined with a direct emphasis on identifiable aspects of estuarine pollution. In essence, the laboratory acquired, and will continue to acquire, an increasingly significant role in the formulation of the agency's pollution control measures as they relate to the improvement and protection of our estuarine and coastal environments.

Historically, the laboratory's research programs have been concentrated on the effects of pesticides on marine and estuarine organisms. In addition to reinforcing this basic thrust, the reorganization brought into focus distinct new areas of environmental concern:

1) The effect of pollutants generated through energy extraction, transmission, conversion and use on both health and the environment;

2) The acceptability of pesticide manufacturing wastes following advanced industrial waste treatment;

3) The environmental impact of off-shore oil exploration and drilling.

Programs directed at these identifiable problems have accordingly been initiated.

The Gulf Breeze Environmental Research Laboratory is currently constructing a new facility which will house the analytical chemistry section and the flowing seawater bioassay effort. This additional laboratory is expected to be completed during the spring of 1977, and is anticipated to increase significantly the organization's capability to respond to both short-term and long-term needs regarding the effects of specific pollutants on estuarine and marine organisms. Recent oil spills along U.S. coastlines serve to re-emphasize the necessity for additional research and safeguards to protect coastal waters.

B. Workforce Profile

The Gulf Breeze Environmental Research Laboratory, as of October 14, 1976, had a total permanent staff of 50, with additional support from eight temporary employees. The laboratory is organizationally divided into three branches:

1) Laboratory Operations and Support Branch
2) Experimental Environments Branch
3) Processes and Effects Branch

As defined in the laboratory's functional statement, these three branches of research have overall responsibility for the management and conduct of research on ecological systems, with direct emphasis on the exposure/effect relationships of hazardous organic and inorganic pollutants in marine, coastal and estuarine ecosystems. The information derived from such research is required by the EPA pesticide registration and control program, and is additionally used in the development of water quality criteria designed to protect human and marine organisms in marine, coastal and estuarine environments. In accord with the laboratory's function statement, the three branches specifically conduct research as follows:

1) Compiling data essential to the maintenance of the EPA pesticide registration and control program;
2) Compiling data essential to the development of EPA Waste Quality criteria;
3) Evaluating effects of halogenated organics on marine and estuarine ecosystems;
4) Assessing problems associated with coastal and estuarine ecosystems characteristic of the South Atlantic and Gulf of Mexico areas;
5) Evaluating effects of pollutants, singly or in combination, on the physiology and development of marine and estuarine organisms;
6) Evaluating effects of long term, low level exposure of pollutants singly or in combination on marine and estuarine community structure and ecosystem dynamics;
7) Evaluating toxic effects of pollutants, singly and in combination, on marine and estuarine organisms;
8) Assessing the hazards of human exposure to pollutants which reach man through bioconcentration in marine and estuarine food chains;
9) Determining the impact of off-shore dumping of petrochemicals on marine and estuarine ecosystems; and,
10) Determining the impact of the extraction, transportation, and processing of petroleum and related products on marine and estuarine ecosystems.

Of the fifty permanent staff members employed at the Gulf Breeze Environmental Research Laboratory, ten hold administrative/supervisory positions, twenty-two work in professional scientific positions, eleven in technician positions and two in clerical positions. In addition, four temporary clerk typists are assigned to the Laboratory Operations and support and four student biological technicians are assigned to temporary positions in the Experimental Environments Branch. The following table depicts current workforce levels for permanent, full-time employees at the Gulf Breeze Environmental Research Laboratory:

TABLE XXVI

U.S. ENVIRONMENTAL PROTECTION AGENCY

Environmental Research Laboratory
Current (1976) Staffing Level

Position		1976
Administrator		10
Chemist		4
Biologist		16
Ecologist		2
Technician/Aide		11
Other		7
	TOTAL	50

C. Workforce Projections

The staffing level of Gulf Breeze Environmental Research Laboratory has been static since 1975. As reported by Ms. A.M. Reynolds, Administrative Officer, the laboratory has a ceiling of fifty permanent positions, and has experienced a turnover rate of less than one percent annually.

From an overview perspective, the Gulf Breeze Laboratory is in an advantageous position when compared to the other six ORD laboratories. In those situations, current staffing exceeds that authorized under existing ceiling levels; as such, equalization through attrition has become necessary, and the replacement of personnel is basically prohibited. In the Gulf Breeze Laboratory, the establishing ceiling level has not been exceeded, and vacancies are filled as they occur.

The laboratory fills the need for technical level positions through two cooperative programs with local post-secondary institutions. The first is a "stay in school" arrangement whereby students work 16 hours a week during the academic year and full-time in the summer. The second is a grant program enabling a graduate student to complete his/her thesis under an agreement with the advisor, thesis chairperson and the laboratory. These programs serve to augment the student's academic pursuits with work experience as well as to assist the laboratory in its effort. However, while these programs appear to perform an invaluable and practical service for both the laboratory and the cooperating institution, they have a significant shortcoming. The laboratory still spends an inordinate amount of time training and retraining technicians at the beginning of each new school term. Further, once the technician/students earn degrees, they are unwilling to continue working at a technician level; professional level positions have not typically been available at the laboratory.

Still, on the whole, both the laboratory and the participating institutions concur in the belief that the program is useful and functional.

Finally, the situation resolves itself into one where ideal academic (classroom and laboratory) conditions are present but the ensuing employment conditions for the graduate are currently less than satisfactory. And, laboratory sources suggest that, over the 1976-1982 period, their complement may be reduced.

D. Training and Certification

Sources in the field indicate that the Gulf Breeze Laboratory has an abundance of highly trained professionals on their current staff. Universities are considered to be adequate in preparing their professional's skills prior to employment at the laboratory. For in-house training, the laboratory frequently retains professionals from the Atlanta EPA Regional Office to conduct training sessions at Gulf Breeze. Additional speakers are often retained to conduct seminars for the existing staff, with compensation being provided by the laboratory. In addition to this in-house effort, the Gulf Breeze Laboratory attempts to provide for employee training through local universities, and if a critical training need exists, attempts to send staff to the EPA National Training Center at Cincinnati.

Although the laboratory's ability to fully utilize outside training opportunities is severely limited by travel restrictions, every effort is made to justify such travel as appropriate. In encouraging staff attendance at job-related courses through local universities, the laboratory provides compensation for tuition and books. With regard to lateral training needs, the laboratory occasionally sponsors attendance at U.S. Civil Service Commission Courses in Atlanta. Technical writing skills and management related skills receive direct emphasis through such offerings.

In view of the fact that the laboratory's staffing pattern is projected to remain static, sources in the field do not anticipate a need in the foreseeable future for local universities to initiate special training programs.

E. Career Potential

Gulf Breeze Laboratory professionals do not currently envision the emergence of new or unique career fields in the next five period; however, the role of the professional statistician, as discussed in the Workforce Projection section of this report, will take on an increasingly significant importance. Although few additional positions are expected to be acquired in the next ten years, upward mobility in the technician level positions is likely.

F. Conclusion

The Gulf Breeze Laboratory is basically a seawater research laboratory with a mission to provide scientific data in support of the program needs of existing environmental pollution control and abatement agencies. Given additional funds, resources, workforce and laboratory space, the Gulf Breeze Environmental Research Laboratory could effectively play a major role in the Environmental Protection

Agency's implementation of the new federal Toxic Substances Control Act. This laboratory is a pioneer in the field, with a demonstrated record of determining the effects of toxics previously suspected as harmless. The data on toxics currently in use by the U.S. Environmental Protection Agency were compiled in great part by the Gulf Breeze Environmental Research Laboratory.

Selected Post Secondary Institutions With Formal Environmental Energy Programs

On the following pages are descriptions of several environmental curricula offered by the University of Florida in Gainesville and Broward Community College. The former institution offers a concentration in Environmental Engineering Sciences on the B.S., M.S, M.Engr., and Ph.D. levels. Broward Community College offers an associate degree in Pest Control Technology.

The University of Florida also offers B.S., M.S., and Ph.D. degrees in Civil Engineering and Nuclear Engineering. Both of these concentrations include environmentally related coursework. The University also houses the recently formed Center for Training, Research and Education for Environmental Occupations.

Florida A&M University offers an A.S. and B.S. degree in Entomology and Structural Pest Control. Other environmental/energy related offerings are included in the Departments of Geography, Civil Engineering, Electrical Power Technology, Mechanical Engineering Technology and Physics.

Rollins College provides a multidisciplinary approach to several learning areas including Environmental Studies. Miami-Dade Community College offers an associate degree in Environmental Control Technology. The course structure is intended to teach students analytical skills which apply to food, water, and air quality problems. In addition to this current program, students may qualify for a two-year degree in civil engineering. Studies include Environmental Engineering Principles, Treatment Operations, Water and Waste Systems, and Public Health and Pollution Control. Miami-Dade also provides three courses in Man and the Environment within Environmental Ecological Education.

A bachelor's degree in Civil Engineering and Environmental Sciences is offered at Florida Technological University. Florida International University offers environmental curricula in its Departments of Environmental Studies, Environmental Engineering Technology and Water Quality Technology. Master's and doctoral programs in Ocean and Environmental Affairs are offered at Heed University.

Brevard Community College offers a two year program in Environmental Control Engineering Technology. Students at Santa Fe Community College may earn an associate degree in Environmental Science, while students at Palm Beach Junior College may qualify for an associate degree in Water and Wastewater Technology. Manatee Junior College offers an A.S. degree in Environmental Studies, while St. Johns River College offers the same degree in Environmental Science.

A number of two year schools offer courses/degrees in water/wastewater technology. State sources predict that 20-25 such programs will be operational and certified by the state agency within several years.

Sources for this information were college publications and interviews with faculty members.

SENIOR INSTITUTIONS

University of Florida
Gainesville, Florida

Program: Environmental Engineering Sciences (B.S., M.S. M. Engr., Ph.D.)

Hours required for major: Quarter - (B.S.) 202, (M.S./M.Engr.) B.S. plus 45, (Ph.D.) M.S./M.Engr. plus a minimum of 96.
Program Inception: 1966
Staff Size: Nine professors, six associate professors, two assistant professors, twenty-five graduate assistants (16 Ph.D.'s, 1 M.S.)

Programs

Bachelor of Science in Environmental Engineering Sciences

Enrollment: 110
Graduates (1976): 6
Placement: 6
Graduate Work (M.S.): 4

Master of Science in Environmental Engineering Sciences

Enrollment: 50
Graduates (1976): 32
Placement: 25
Graduate Work (Ph.D.): 7

Master of Engineering in Environmental Engineering Sciences

Enrollment: 30
Graduates (1976): 8
Placement: 7
Graduate Work (Ph.D.): 1

Ph.D. in Environmental Engineering Sciences

Enrollment: 30
Graduates (1976): 7
Placement: 7
Graduate Work: 0

Courses (Undergraduate)

Concepts of Environmental Engineering Sciences
Environmental Quality and Man
Undergraduate Seminar
Basic Concepts of Water and Wastewater Treatment

Environmental Engineering Sciences
Environmental Microbiology
Public Health Engineering
Introduction to Water Analysis
The Chemistry of Water Treatment
Introduction to Radiological Health
Fundamentals of Radiation Protection
Elements of Atmospheric Pollution
Solid Waste Management
Individual Studies in Environmental Engineering Sciences

Courses (Graduate)

Treatment of Wastewater
Environmental Biology
Environmental Health
Water and Wastewater Analysis
Survey of Radiological Health
Introduction to Air Pollution
Ecological and General Systems
Ecological Engineering Seminar
Municipal Refuse Disposal
Special Topics in Environmental Engineering
Advanced Waste Treatment Operations
Advanced Environmental Engineering Design I
Advanced Environmental Engineering Design 2
Water Quality Management
Water Management Seminar
Environmental Resource Systems
Advanced Water Supply Engineering
Urban Environmental Problems
Estuarine Systems
Pollution Transport Systems
Aquatic Microbiology
Biology of Aquatic Systems
Environmental Microbiology
Environmental Chemistry
Advanced Water Analysis
Principles of Water Chemistry I
Principles of Water Chemistry 2
Advanced Water Treatment
Radiological Techniques
Radioactive Wastes
Electronic Product Radiation
Health Physics
Occupational Health

Environmental Instrumentation
Aerosol Mechanics
Air Pollution Sampling and Analysis
Air Pollution Control Measures
Environmental Meteorology
Environmental Micrometeorology
Health Hazards of Man's Environment
Graduate Environmental Engineering Seminar
Special Problems in Environmental Engineering
Design of Solid Waste Management Systems
Non-Thesis Project
Individual Work
Master's Research
Doctoral Research
Surface Hydrology
Operational Hydrology I
Operational Hydrology II

COMMUNITY COLLEGES/TECHNICAL INSTITUTIONS

Broward Community College
Broward, Florida

Program: Pest Control Technology Program (A.S.)

Hours required for major: Semester - Major 70.
Program Inception: 1971
Staff Size: Eight instructors (2 Ph.D., 2 M.S., 4 B.S.)
Enrollment: 125
Graduates: 6
Placement: 6
Graduate Work (B.S.): 0

Courses

Economic Entomology
Pesticides
Insect Identification
Field Service I
Household Pests and Control
Wood Destroying Pests and Their Control
Pest Control Business Administration
Advanced Field Service

State Legislation

FLORIDA GENERAL

TITLE:

Environmental Protection Act
Florida Statutes 403.412

PURPOSE:

To provide for the general enforcement of pollution control laws.

DEFINITIONS:

ADMINISTERING AUTHORITY:

All Governmental Agencies and Citizens

AUTHORIZATIONS:

To maintain actions against pollution enforcement agencies and persons to enforce those pollution laws;
To file complaints concerning failure to enforce.

FLORIDA AIR/WATER

TITLE:

Air and Water Pollution Control Act
Florida Statutes 403.011

PURPOSE:

To achieve and maintain levels of air quality as will protect human health and safety, and to conserve the waters of the state and protect, maintain and improve the quality thereof.

DEFINITIONS:

1. Department
2. Pollution
3. Waters
4. Contaminant
5. Wastes
6. Treatment works/ disposal system
7. Sewerage system
8. Installation
9. Plant
10. Source
11. Person
12. Effluent limitations

ADMINISTERING AUTHORITY:

Department of Environmental Regulation

AUTHORIZATIONS:

To control and prohibit air and water pollution;
To develop long-range air and water plans;
To act as the state lead agency in air and water matters;
To issue regulations and enforce the act;
To establish water quality and air quality standards;
To conduct permit program for air and water pollution sources;
To control detergent sales;
To collect and disseminate pollution information;
To administer water pollution control and sewage system grants.

CERTIFICATION OR LICENSING:

Water pollution discharges must be done pursuant to discharge permit;
Weather modification personnel must be licensed.

PROHIBITED ACTS:

To cause air or water pollution which harms environment;
To fail to obtain or comply with any needed permits;
To falsify information on reports or applications;
To transfer or transport aquatic plants without authority.

PENALTIES:

Liability imposed for damages caused;
General violations - fines of from $2,500 to $25,000 or one year in jail;
Falsification violations - fines of up to $10,000 or six months in jail.

FLORIDA NOISE

TITLE:

Motor Vehicle Noise Prevention and Control Act
Florida Statutes 403.415

PURPOSE:

To improve the quality of life through limiting the noise of motor vehicles in the state.

DEFINITIONS:

1. dBA
2. Gross combination weight rating
3. Gross vehicle weight rating
4. Motor vehicle
5. Motorcycle
6. Motor-driven cycle
7. Sound level
8. Vehicle
9. Department

ADMINISTERING AUTHORITY:

Department of Environmental Regulation

AUTHORIZATIONS:

To limit new vehicle noise emissions to stated levels;
To issue regulations to enforce the act;
To implement noise measurement of motor vehicles.

PROHIBITED ACTS:

To sell, offer or lease motor vehicles not meeting stated noise levels;
To sell or offer mufflers and other noise abatement which will not limit noise sufficiently

EXEMPTIONS:

Unlicensed motor vehicles.

FLORIDA PESTICIDES

TITLE:

Pesticide Application Act of 1974
Florida Statutes 487.151

PURPOSE:

To regulate, in the public interest, the use and application of restricted pesticides.

DEFINITIONS:

1. Aircraft
2. Animal
3. Certification
4. Certified applicator
5. Commercial applicator
6. Council
7. Defoliant
8. Desiccant
9. Device
10. Equipment
11. Fungi
12. Fungicide
13. Herbicide
14. Insect
15. Insecticide
16. Land
17. Nematocide
18. Nematode
19. Person
20. Pest
21. Pesticide
22. Plant regulator
23. Private applicator
24. Public applicator
25. Restricted pesticide
26. Rodenticide
27. Under the direct supervision of a certified applicator
28. Unreasonable adverse effect on environment
29. Weed
30. Wildlife

ADMINISTERING AUTHORITY:

Department of Agriculture and Consumer Services
Pesticide Application Council

AUTHORIZATIONS:

To issue regulations relating to applicator classifications;
To generally enforce the act;
To certify pesticide applicators and issue standards.

CERTIFICATION OR LICENSING:

All restricted pesticide applicators must be certified; must show competence through examination or otherwise.

PROHIBITED ACTS:

To engage in restricted pesticide application without proper certification.

EXEMPTIONS:

Structural pest operators;
Public agency experimental uses.

PENALTIES:

First offense - second degree misdemeanor;
Subsequent offenses - first degree misdemeanor.

FLORIDA POTABLE WATER

TITLE:

Water Resources Act of 1972
Florida Statutes 373.012

PURPOSE:

To conserve, protect, manage and control the waters of the state to promote the health, safety and general welfare of the people.

DEFINITIONS:

1. Department
2. Division
3. Water management district
4. Governing board
5. Reasonable beneficial use
6. Person
7. Domestic use
8. Nonregulated use
9. Water
10. Groundwater
11. Surface water
12. Stream
13. Other watercourse
14. Coastal waters
15. Impoundment
16. Artesian well
17. Waste

ADMINISTERING AUTHORITY:

Department of Environmental Regulation
Water Management Districts

AUTHORIZATIONS:

To conduct surveys and investigations of water quality and use;
To cooperate with other agencies to conserve and protect waters of the state;
To supervise local management water activities;
To hold conferences and provide public information concerning water resources of the state;

AUTHORIZATIONS (Cont'd)

To develop a state water use plan;
To issue regulations and to enforce the act;
To issue permits regarding waters affecting underground formation;
To assist in meeting water supply needs;
To issue permits for consumptive uses of water;
To develop contingency plans for water shortages.

PROHIBITED ACTS:

To pump, use, or allow to flow unnecessarily water from an artesian well;
To fail to obtain any permit which may be required.

PENALTIES:

Civil fines of up to $100 per day.

FLORIDA SOLID WASTE

TITLE:

Florida Litter Law
Florida Statutes 403.413

PURPOSE:

To provide for the control of the disposal and discarding of litter.

DEFINITIONS:

1. Litter
2. Person
3. Law enforcement officer

ADMINISTERING AUTHORITY:

Board of County Commissioners
Law Enforcement Personnel

AUTHORIZATIONS:

To prevent the uncontrolled discarding of litter.

PROHIBITED ACTS:

To throw, discard or dispose of litter on public lands, waters or private property, except in containers intended therefore.

PENALTIES:

Violations constitute misdemeanor.

FLORIDA SOLID WASTE

TITLE:

Resource Recovery and Management Act
Florida Statutes 403.701

PURPOSE:

To plan for and regulate the storage, collection, processing, recycling, and disposal of solid waste to protect the public safety, enhance the environment, and recover resources which have potential further use.

DEFINITIONS:

1. Department
2. County or municipality
3. Person
4. Recycling
5. Resource management
6. Resource recovery
7. Resource recovery and management facility
8. Solid waste
9. Volume reduction plant

ADMINISTERING AUTHORITY:

Department of Environmental Regulation
Resource Recovery Council

AUTHORIZATIONS:

To adopt a resource recovery and management plan;
To assist other agencies in carrying out the act;
To encourage resource recovery and recycling and related industries;
To acquire, construct and operate necessary facilities under the act;
To act as the state lead agency in solid waste and resource recovery matters;
To supervise required local resource management activities;
To issue permits for resource recovery and management facilities;
To issue regulations pursuant to the act.

PROHIBITED ACTS:

To burn solid waste in unauthorized manner;
To operate or construct resource facility without permit;
To dispose of solid waste improperly or away from facility.

PENALTIES:

Liability imposed for damage caused;
Fines of up to $10,000.

FLORIDA WASTE WATER

TITLE:

Pollutant Spill Prevention and Control Act
Florida Statutes 376

PURPOSE:

To control pollutant discharge hazards into waters of the state, and to protect the seacoast area of the state.

DEFINITIONS:

1. Department
2. Director
3. Board
4. Other measurements
5. Discharge
6. Fund
7. Pollutants
8. Pollution
9. Terminal facility
10. Owner
11. Transfer
12. Vessel
13. Person in charge
14. Discharge cleanup organization
15. Person
16. Registrant

ADMINISTERING AUTHORITY:

Department of Natural Resources

AUTHORIZATIONS:

To issue regulations pursuant to the act;
To submit reports to the legislature;
To develop discharge pollution criteria;
To issue terminal facility registrations;
To supervise any cleanup procedures, including expenses involved;
To enforce the act.

PROHIBITED ACTS:

To discharge pollutants into state waters in violation of
regulations;
To fail to register facilities or operate without registration;
To fail to contain or abate any pollutant discharge;
To leave wrecked or damaged vessels on public waters.

PENALTIES:

Fines of up to $50,000;
Liability imposed for all cleanup expenses.

FLORIDA WASTE WATER

TITLE:

Environmental Land and Water Management Act of 1972
Florida Statutes 380

PURPOSE:

To provide for land and water management policies in the state and to best protect the natural resources of the state.

DEFINITIONS:

1. Administration commission
2. Development
3. Development order
4. Development permit
5. Developer
6. Governmental agency
7. Land
8. Land development regulations
9. Land use
10. Local government
11. Major public facility
12. Parcel of land
13. Person
14. Regional planning agency
15. Rule
16. State land development plan
17. State land planning agency
18. Structure

ADMINISTERING AUTHORITY:

Administration Commission
State and Local Agencies

AUTHORIZATIONS:

To designate land areas of critical concern for environmental, natural or historical purposes;
To issue regulations regarding such areas;
To limit development in such areas;

AUTHORIZATIONS (Cont'd):

To designate the Big Cypress Area as one such area;
To assess environmental impact of proposed development;
To study the effect of land resource management plans;
To issue regulations pursuant to the act and to enforce the act.